

EMPTY CATEGORIES AND KOREAN PHONOLOGY

by

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ABSTRACT

This thesis discusses the behaviour of empty nuclei in Korean. The theory of Charm and Government is the framework on which my analysis is based.

GP claims that a nucleus which dominates a vowel that regularly undergoes elision in specific contexts is underlyingly empty. Whether or not an empty nucleus is realised phonetically is not a question of representation, but is a question of interpretation.

In the first chapter, I present the relevant facts involving word (or domain)-internal empty nuclei. [i]-zero alternation in verbal suffixation is also shown in this chapter.

In the second chapter, I discuss the syllable structure of Korean. I propose that the rhyme does not branch in this language. Following this, an apparent consonant cluster is in fact separated by an empty nucleus.

This is followed by the third and fourth chapters with the consideration of domain-internal and final empty nuclei in Korean. I show that the domain-final empty nucleus in Korean is licensed. A domain-internal empty nucleus may or may not be phonetically interpreted depending on proper government and inter-onset government.

The properties of domain-final empty nuclei in Korean are discussed in the fifth chapter. We will see that domain-final empty nuclei in Korean do not have government-licensing properties. As for the apparent exceptional cases where [i] is pronounced in domain-final position, I account for these with evidence that they are morphologically complex.

In the final chapter, I discuss [i]-zero alternation in verbal and nominal suffixations. In the case of nominal suffixation, [i]-zero alternation between the stem and suffix is exactly the same as in morphologically simplex words, thus, is accounted for by proper government and inter-onset government. On the other hand, [i]-zero alternation in verbal suffixation is somewhat different from that in morphologically simplex words.

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Introduction

1. Outline

This thesis discusses the behaviour of empty nuclei in Korean. The framework in which this thesis is couched is Government Phonology (henceforth, GP).

GP claims that a nucleus which dominates a vowel that regularly undergoes elision in specific contexts is underlyingly empty. Whether or not an empty nucleus is realised phonetically is not a question of representation, but is a question of interpretation.

Vowel-zero alternations are found in Korean. Words contain empty nuclei which are manifested as [i] in certain circumstances. The contexts which condition the phonetic interpretation of an empty nucleus in Korean, and the effects of its presence on consonants, will be accounted for.

In the first chapter, I present the relevant facts involving word (or domain)-internal empty nuclei. [i]-zero alternation in verbal suffixation is also shown in this chapter.

In the second chapter, I discuss the syllable structure of Korean. It has been argued that Korean has branching rhymes. I propose, however, that the rhyme does not branch in this language, and along this line, I present evidence in this chapter to support the claim that Korean contains only

open syllables. Following this, an apparent consonant cluster is in fact separated by an empty nucleus.

This is followed by the third chapter with the consideration of domain-internal and final empty nuclei in Korean. I show that the domain-final empty nucleus in Korean is licensed. We will see that in Korean, a domain-final empty nucleus has restricted licensing properties. That is, Korean allows words ending phonetically in a consonant, but does not tolerate segments that contain the element H^- or segments that lack the element $?$ ° before domain-final empty nuclei. In addition, it is argued that the high, unrounded, central vowel [i] in Korean, which appears in the domain-internal position is underlyingly an empty nucleus. A domain-internal empty nucleus may or may not be phonetically interpreted depending on proper government.

The discussion of the licensing of domain-internal empty nuclear position is continued in Chapter four. I argue that a properly governable domain-internal empty nucleus cannot be licensed if inter-onset government formed by the surrounding consonants fails to be formed.

The properties of domain-final empty nuclei in Korean are discussed in the fifth chapter. We will see that domain-final empty nuclei in Korean do not have government-licensing properties. In the case where a consonant-initial suffix followed by a licensed final empty nucleus is analytically affixed to a domain ending in a consonant followed by a licensed final empty nucleus, one of the two consonants must not be interpreted. As for the apparent exceptional cases where [i] is pronounced in domain-final position, I account for these with evidence that they are morphologically complex.

In the final chapter, I discuss [i]-zero alternation in verbal and nominal suffixations. We will see that the suffixes that trigger [i]-zero alternation between the stem and suffix are non-analytic. In the case of nominal suffixation, [i]-zero alternation between the stem and suffix is exactly the same as in morphologically simplex words, thus, is accounted for by proper government and inter-onset government. On the other hand, [i]-zero alternation in verbal suffixation is somewhat different from that in morphologically simplex words.

2. Some basic principles in Government Phonology

GP is based on the notion of principles and parameters as developed by Chomsky (1981). Since many previous works have been published within this framework, the reader is referred to the relevant literature for a detailed discussion.¹ In this section, I outline the main points that are relevant to this thesis, and I introduce the details of these and other notions of GP when they become relevant to my discussion.

GP is based on the claim that words are not constituted of unorganised sequences of segments. Syllable structures of phonological words are formed based on governing relations which are established at the level of lexical representation.² Segments and skeletal points are bound together through government.³ This is expressed in (1&2) below.

¹The most important statements of GP are made in Kaye, Lowenstamm and Vergnaud (henceforth KLV 1985&1990) and Charette (1991a). Further important work in this framework is contained in Kaye (1987, 1990a, 1990b, 1992, 1993), Charette (1988, 1990a, 1990b, 1991b, 1992), Harris (1990), Harris & Kaye (1990) and in Harris & Lindsey (1990).

²The level of lexical representation is defined as 'the level at which the stem is attached to accompanying affixes, if any' (KLV 1990, endnote 34). Selkirk (1982) also points out that syllable structure is present in underlying representation:

(1) **Strict Adjacency**

No position must intervene between a governor and its governee

(2) **Strict Directionality**

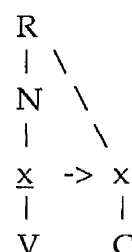
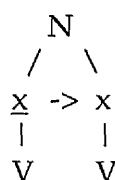
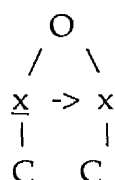
a. Directionality of government at the skeletal level is universal⁴

(not parameterised as in syntax)

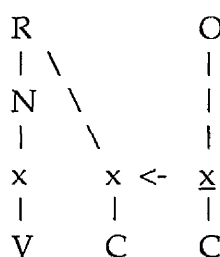
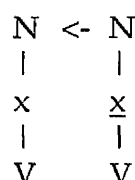
(i) Constituent government - Head initial

(ii) Interconstituent government - Head final

b. constituent government



c. interconstituent government



".... We think of them [the principles of basic syllable composition/YH] as well-formedness conditions on underlying phonological representation, which thus is to be thought of as having syllable structure." (1982: 356)

³Selkirk (1982) has made a similar claim in the name of the Immediate Constituent (IC) principle of phonotactic constraints which states:

"... the more closely related structurally (in the obvious sense), the more subject to phonotactic constraints two position slots are." (1982: 339)

⁴The direction of government at higher levels such as at the nuclear projection, is parametric, viz., it is either left-headed or right-headed. Note that the head of the governing relation is underlined.



A direct result of these two principles is that all syllabic constituents are maximally binary (Binarity Theorem).⁵

GP provides three types of syllabic constituents: onset (O), nucleus (N) and rhyme (R). Except for the head, in order for these constituents to appear with their skeletal points⁶ in syllable structure, they must be licensed. This is stated by the Licensing Principle in (3).

(3) **Licensing Principle** (Kaye 1990b: 306)

All phonological positions save one must be licensed within a domain. The unlicensed position is the head of this domain.

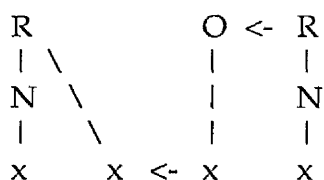
The onset constituent is licensed by the following nucleus. This follows from the claim that the nucleus has the property of licensing. Thus, onsets must be followed by a nucleus in syllable structure. A rhymal (i.e. post-nuclear) position directly associates with the rhyme constituent and is c-commanded by the nucleus. In this case, a nucleus contains a single skeletal point, so as not to violate the binary theorem. Nuclei (apart from the domain head) are licensed under government by the head of domain. Furthermore, natural languages show that there are collocational restrictions between post-nuclear consonant sequences (for instance, English allows 'act', but not *'atc'). The two consonants of this sequence form interconstituent government. Whether or not a consonant is syllabified into a rhymal position is determined by the Coda Licensing Principle.

⁵At first glance, the Binarity Theorem may be faced with counterexamples which contain three consonants word-initially (e.g. s+consonant sequences such as in 'strike'). As for these words, GP claims that they are not members of the same constituent, but are syllabified into two different constituents. See KLV (1990) and Kaye (1992&1993) for a detailed discussion.

⁶In certain cases, such as in vowel-initial words and in the interconstituent government formed by two nuclei, the onset constituent need not dominate a skeletal point. See Yoshida (1991) and Da Silva (1992b).

(4) **Coda Licensing Principle** (Kaye 1990b: 311)

Post-nuclear rhyml positions must be licensed by a following onset.



This states that in order to be syllabified within a rhyml position, a consonant must be governed by a consonant in a following onset.⁷ It follows from the two principles above that a phonological domain must end in a nucleus which assures the licensing of the onset preceding it. Therefore, an apparent word-final consonant is in reality followed by a domain-final empty nucleus. As for the licensing of the domain-final empty nucleus as well as of a domain-internal empty nucleus, GP supplies the Empty Category Principle.⁸

(5) **Empty Category Principle** (Kaye 1990b: 314)

- i. A licensed empty nucleus has no phonetic realisation
- ii. An empty nucleus is licensed if (a) it is properly governed or (b) if it is domain final in languages which licenses domain-final empty nuclei

⁷The structure in (4) captures a particular phenomenon with regard to collocational restrictions. Since the governors for the post-nuclear position are dominated by different constituents (i.e. N in the case of the nuclear position, and the following O in the case of the non-nuclear position), there are different constraints determining which segments can appear in the coda position, compared to those which can appear in the governee position of a branching onset. I will give a more detailed discussion of this in Chapter 2.

⁸The following version in (5-7) differs slightly from that found in Kaye (1992). The difference in formulation has no bearing on the discussion of this thesis.

(6) **Government** (Charette 1991a: 83)

A nucleus α is in a governing relation with a nucleus β iff

- (i) α and β are adjacent at this level of projection
- (ii) the relation is directional (from right-to-left or left-to-right)

(7) **Proper Government** (Charette 1991a: 83)

A nucleus α properly governs an empty nucleus β iff

- (i) α governs β
- (ii) α is not itself licensed

Firstly, as can be seen in (5), the licensing of domain-final empty nuclei is parametric. On the one hand, languages which do not license domain-final empty nuclei would obligatorily give phonetic interpretation to those nuclei. On the other hand, in languages which license domain-final empty nuclei, words may appear to end in consonants.

Secondly, what determines whether a domain-internal empty nucleus may be left without phonetic manifestation is whether or not it is properly governed. According to proper government, a domain-internal empty nucleus may be realised as null when it is adjacent to another nucleus which itself is unlicensed. If proper government cannot apply, the domain-internal empty nucleus must be phonetically expressed.

We have so far given some key principles of GP. As mentioned above, I will delineate the details of these notions as necessary. Other notions, such as the Government-Licensing Principle and inter-onset government, will also be introduced during the discussion.

3. Underlying representations of Korean

According to GP, segments are composed of elements. The element is the primitive phonological unit and it contains a salient property. In addition, segments can differ in charm property. Whether or not a segment is charmed (positive or negative) is determined by the elements it contains. Negatively charmed segments, which are relevant to consonants, contain a negative element (-), and positively charmed segments, which are relevant to vowels, contain a positive element (+). Elements that are not charmed are neutral or charmless. All phonological elements which are discussed in GP are given below in (8).⁹

(8)	Elements	Salient property	Elements	Salient property
	A ⁺	openness	U ^o	roundness/labial
	I ^o	frontness/palatal	v ^o	none
	R ^o	coronal	? ^o	occluded
	h ^o	narrowed	N ⁺	nasal
	H ⁻	stiff vocal cords	L ⁻	slack vocal cords

Based on the above discussion, I propose the following underlying representations of Korean vocalic and consonantal segments.

⁹Phonological elements are proposed by KLV (1985, 1990). Harris (1990&1992) and Harris & Lindsey (1990) supply a refined interpretation (cf. Chapter 3 in this thesis).

(9) a. consonants¹⁰

i. neutrally charmed segments

p ^o	t ^o	k ^o	c ^o	s ^o	m	n	ŋ	r	h
x	x	x	x	x	x	x	x	x	x
ʔ ^o	ʔ ^o	ʔ ^o	ʔ ^o	h ^o	ʔ ^o	ʔ ^o	ʔ ^o	<u>R^o</u>	<u>h^o</u>
<u>U^o</u>	<u>R^o</u>	<u>v^o</u>	<u>R^o</u>	<u>R^o</u>	<u>U^o</u>	<u>R^o</u>	<u>v^o</u>		
h ^o	h ^o	h ^o	I ^o		N ⁺	N ⁺	N ⁺		
			h ^o		L ⁻	L ⁻	L ⁻		

ii. negatively charmed segments

ii-1. tensed segments

p'	t'	k'	c'	s'
x	x	x	x	x
ʔ ^o	ʔ ^o	ʔ ^o	ʔ ^o	h ^o
<u>U^o</u>	<u>R^o</u>	<u>v^o</u>	<u>R^o</u>	<u>R^o</u>
H ⁻	H ⁻	H ⁻	I ^o	H ⁻
h ^o	h ^o	h ^o	H ⁻	
			h ^o	

¹⁰See chapters 3&4 for a detailed discussion of consonantal representations.

ii-2. aspirated segments

p ^h	t ^h	k ^h	c ^h
x | \	x | \	x | \	x | \
ʔ ^o \	ʔ ^o \	ʔ ^o \	ʔ ^o \
/	/	/	/
h ^o	h ^o	h ^o	h ^o
<u>U^o</u>	<u>R^o</u>	<u>v^o</u>	<u>R^o</u>
H ⁻	H ⁻	H ⁻	I ^o
			H ⁻

b. vowels¹¹

i	i	u	e	ə	o	æ	a	ü	ö
x	x	x	x	x	x	x	x	x	x
I ^o	v ^o	U ^o	I ^o	U ^o	A ⁺	A ⁺	A ⁺	U ^o	A ⁺
			A ⁺	A ⁺	U ^o	I ^o	v ^o	I ^o	U ^o
									I ^o

4. Abbreviations

C	consonant
caus.	causative
ECP	Empty Category Principle
fem.	feminine
FOD	Final Obstruent Devoicing
G	glide

¹¹See Chung (1994) for a detailed discussion on Korean vowel system.

gen.	genitive
imp.	imperative
inter.	interrogative
masc.	masculine
N	nucleus
nom.	nominative
O	onset
OCP	Obligatory Contour Principle
pl.	plural
R	rhyme
sg.	singular
stat.	stative
suf.	suffix
UG	Universal Grammar
V	vowel

Chapter One

THE FACTS OF THE UNROUNDED HIGH CENTRAL VOWEL

1.1 Introduction

The vowel-zero (ø) alternation process is attested in a vast number of languages, and phonologists have analysed it within a variety of theoretical frameworks.¹ General aspects of this process can be illustrated by the following Moroccan Arabic examples (Charette 1991a: 114):

- (1) akølu '(they) eat' akil '(he) eats'
gilta 'puddle (fem.)'

We observe from the above examples that the zero (\emptyset) alternant is found when the position precedes the sequence of a single consonant followed by a vowel (cf. [akølu]), but a vowel manifests itself when the position is either followed by two consonants in sequence (cf. [gĩlta]), or is followed by a word-final single consonant (cf. [akil]). The vowel-zero alternation process in other languages is by and large the same as above.

However, as we shall see below, the process of [i]-zero alternation in Korean is different, in many respects, from the above. Firstly, the vowel [i] can occur even if it is followed by a vowel, separated by a

¹For instance, among others, Haddad (1984) for the case of Lebanese Arabic in terms of sonority; Mors (1985) for Klamath in terms of the autosegmental approach; Spencer (1986, 1988) for Polish in terms of Lexical Phonology; Kaye (1987, 1990b) and Charette (1988, 1990a, 1991a) for Moroccan Arabic and French respectively, in terms of Government Phonology.

single consonant (e.g. [p^oas^oirak^oi] 'scraps'). Secondly, the alternation can only be observed between stem and suffix (e.g. /mak^o + mjə/ [mak^oimjə] (*[mak^omjə]) 'to block and' vs. /u:l + mjə/ [u:lmjə] (*[u:limjə]) 'to cry and'). In other words, there are no cases in which the vowel [i] in the stem undergoes elision when a vowel-initial suffix is added (e.g. /s^oas^oim + i/ ('deer' + nom. suffix) --> [s^oas^oimi] (*[s^oas^omi])). This shows a different behavioural pattern of alternating vowels from that found in other languages; the latter are sometimes present and sometimes absent, according to the contexts that follow, as seen in the Moroccan Arabic data discussed above. Thus, the standard analyses of the Korean alternation have been restricted to the position between stem and suffix (e.g. [mak^oimjə] vs. [u:lmjə]), but have never been extended to other positions.

Despite the above facts, which appear to show that [i] in Korean differs little from the non-alternating vowels of this language, there is good evidence to claim that this vowel has a special status in Korean phonology. That is, as we shall see below, Korean [i] does not behave arbitrarily, but appears and disappears systematically. In addition, as mentioned above, the vowel does alternate with zero in certain contexts. This process may be accounted for by the claim that a nucleus that dominates a vowel which regularly undergoes elision may be underlyingly empty, and is interpreted either as zero or a vowel, according to conditions of government in the phonological domain. This notion will be developed throughout the discussion in the following chapters.

Therefore, I would like to claim that the properties of [i] in Korean are the same as those of alternating vowels in other languages. In other words, we can predict the behaviour of this vowel both in

morphologically simplex words as well as in morphologically complex words. Thus, the purpose of this thesis is to show that the alternation of the unrounded high central vowel with zero is systematic. In this chapter I demonstrate the behaviour of this vowel.

In the following sections, I present some data which contain [i] in various nuclear positions within a word (1.2.1-1.2.4), and within verbal conjugations (1.2.5). It will be seen that the presence or absence of this vowel relates to the presence or absence of the following vowel, and to the quality of the surrounding consonants.

Firstly, in 1.2.1, we will see that Korean has few words ending in [i], whereas other vowels freely occur in this position. In the following section, we will consider word-internal [i], and I present some examples which show how the interpretation of this vowel is related to the presence or absence of the following vowel. From the data in this section, we will note the presence of the zero ([ø])-alternant when a following vowel is present across a single consonant, and the presence of the [i]-alternant when the position is either followed by two consonants, or is followed by a word-final single consonant. The conclusion can be drawn that the vowel [i] in Korean has the same properties as those in other languages.

However, we often encounter exceptions to the above. That is, there are words which manifest [i] when followed by a single consonant and a vowel. These cases will be discussed in sections 1.2.3 & 1.2.4. It will be revealed in 1.2.3 that it is the relation between the consonants surrounding the nucleus that determines whether this vowel is audible or not. In 1.2.4, I show that the vowel [i] must be audible if it is preceded by a fricative or an affricate. Finally, we will see in 1.2.5 that

[i]-realisation in verbal conjugations is slightly different from that in morphologically simplex words.

1.2 The data

In order to understand the properties of the unrounded high central vowel [i] of Korean, we must first determine its distribution in a word. Let us first discuss word-final [i].

1.2.1 Word-final [i]

Words in Korean may end in either a consonant (e.g. [c°ip°] 'house') or a vowel (e.g. [ak°a] 'baby'). What is primarily significant in considering [i] in Korean is that words ending in [i] are quite rare.² It follows from this fact that the vowel [i] has some unusual properties: if this vowel had the same properties as other vowels, we would expect it to have the same distribution. Thus, we can make our first generalisation concerning [i]:

(2) [i] may not appear word-finally.

²To my knowledge, only three words end in this vowel: [k°i] 'he', [jəni] 'other (person)' and [ənɪ] 'an interrogative pronoun'. On the realisation of [i] in this position, see Chapter 5 on [k°i], and Heo (1991a) on [jəni].

1.2.2 Word-internal [i] : some simple cases

What Korean phonologists have not recognised, but is surely obvious, is that the manifestation of [i] is determined by the number of consonants following it.

First, let us consider the positions where the high central vowel may not appear, but where other vocalic segments are audible. Consider the following examples in (3), where a vowel is followed by a single consonant and another vowel.

(3)	ak ^o as'i	'lady'	s ^o onak ^o i	'shower'
	arit'ap ^o	'charming'	mirinæ	'the galaxy'
	oroc ^o i	'only'	k ^o ororoŋ	'suffering'
	k ^o uruma	'cart'	mæmus ^o æ	'attire'
	t ^o aræk'i	'sty'	s ^o iræk ^o i	'rubbish'
	p ^o erēc ^o i	'insect'	k'urəmi	'parcel'

It should be noted that the vowels in bold in the above words can be replaced with other vocalic segments, but not with [i]. This follows from the fact that, even though there are some words which contain [i] in the same context, they are either morphologically complex, or can be pronounced without the vowel. For instance, the word [p^oanic^oil] 'sewing' is derived from /p^oanir + c^oir/ 'needle + suf.',³ and the word 'to teach' is pronounced either [k^oaric^{hi}] or [k^oalc^{hi}].⁴

In order to grasp the precise contexts of the behaviour of the vowel [i] in word-internal position, it is worthwhile to compare the words in (3)

³An independent process, /r/-deletion before a palatal consonant, applies to this word. See Chapter 2, on the [r] ~ [l] alternation.

⁴We note that, in morphologically simplex words of Korean, there are no more than 5 words which manifests [i] in the same context as in (3). See Heo (1992) for a detailed discussion.

above with the examples in (4), in which [i] cannot be absent from its position.

(4) a. [i] before CC

k ^o at ^o ilmak ^o	'be arrogant'	s ^o ik ^h int ^o uŋ	'be impudent'
s ^o ik ^o imch ⁱ	'spinach'	k ^o as ^o imch ⁱ ire	'be sleepy'
murip ^o s ⁱ	'to venture'	mint ^o ille	'the dandelion'
t ^o as ^o ilk ^o i	'gastropods'	k ^o ot ^o ilk ^o æ	'cowbell'

b. [i] before C#

k ^o us ^o il	'pearl'	s ^o as ^o im	'deer'
mo:p ^o s ⁱ il	'wicked'	k ^o at ^o ik ^o	'full'
mæt ^o ip ^o	'knot'	c ^o ims ^o iŋ	'animal'
s ^o imp ^o urim	'errand'	wac ^o ik ⁱ in	'crashing'

Note that it is impossible to find apparent CCC clusters or final CC clusters in Korean. We can now confirm that the properties of [i] in Korean are similar in many respects to the vowel which alternates with zero in languages such as Polish (Spencer 1986, 1988, 1991, Gussmann 1980, Rubach 1984, 1985, Booij & Rubach 1984, 1987, Rubach & Booij 1985 among others); Serbo-Croatian (Bochner 1981); and French (Selkirk 1978, Anderson 1982, Charette 1991) among others.

From the comparison of words in (3) and (4), it is sufficient to say at this stage that the high central vowel must occur before an apparent consonant cluster, but it should not be expressed before a single consonant that is followed by a filled nucleus. The latter property is not found in other vocalic segments, which can appear in the same context. Therefore, we can formulate another condition on the absence of [i], as below.

- (5) The zero alternant is possible before a single consonant that is followed by a filled nucleus.

We have so far examined some simple instances of the [i]-zero alternation of Korean. They are summarised as follows:

- (6) a. The absence of [i] is observed
- i. word-finally (with three exceptions), or
 - ii. before a single consonant followed by a filled nucleus
- b. [i] must be present
- i. before CC, or
 - ii. before C#

1.2.3 Word-internal [i] and the surrounding consonants

In the following sections, we will consider more examples in which [i] is manifested in a nucleus which is followed by another nucleus that contains a segment (e.g. [s'irek^oi] 'rubbish' and [c^oinirəmi] 'fin'). As can be seen below in (7), many words in Korean fall into this group.

(7)	nik'i	'to feel'	c ^o inirəmi	'fin'
	nithari	'agaric'	hət ^o ire	'trash'
	k ^o ich'i	'to stop'	p ^o us ^o irəm	'ulcer'
	k ^o iman	'no more'	mik'irəc ^o i	'to slip'
	s ^o ich'i	'to pass by'	nak ^o ine	'passenger'
	s ^o imul	'twenty'	k ^o oc ^o inək ^o	'be silent'
	t ^o imul	'be rare'	silk ^o iməni	'secretely'
	niri	'be slow'	k'it ^h iməri	'end'
	s'irek ^o i	'rubbish'	əc ^o ip ^o ə	'alas'
	k ^o iræt ^o o	'even if'	p ^o ant ^o is ^o i	'certainly'

tʰic°ip°	'fault'	t°əlkʰit°ək°	'click'
t'ik°əp°	'be hot'	s°öt'ik°i	'horsetail'

The first column contains words manifesting [i] in the first syllable, which, by (6aii), should not be present. In fact, there is no case in which [i] in the first nuclear position can be absent. Thus, we can define the following condition:

- (8) [i] in the first nucleus of a word cannot be absent.

The second column contains words in which the vowel [i] is shown in the penultimate or antepenultimate nuclear position, and is followed by another vowel in the following nucleus. At first glance, these words would lead us to reject the generalisation of (6aii).

To be able to see more clearly the contexts involved, let me make a detailed comparison with words which do not contain [i]. The examples in (9) illustrate nuclei occurring after and before a consonant (in the first and second columns, respectively). The rows in (a) show nuclei adjacent to a liquid; the rows in (b) show nuclei adjacent to a nasal; the rows in (c) show neutral stops in the same position; and the final rows in (d) illustrate the effect of a negatively charmed, i.e. tensed/aspirated segment.

(9) a. after a liquid

a'. before a liquid

k ^o ə:lle ⁵	'dustcloth'	-	
k ^o o:lmok ^o	'alley'	c ^o inirəmi	'fin'
t'a:lk ^o i	'strawberry'	hət ^o ire	'trash'
k ^o u:lt'uk ^o	'chimney'	mik'irəc ^o i	'to slip'

b. after a nasal⁶

b'. before a nasal

c ^o inirəmi	'fin'	k ^o o:lmok ^o	'alley'
t ^o o:ŋnjaŋ	'begging'	-	
a:ngæ	'fog'	nak ^o ine	'passenger'
o:nt ^h oŋ	'whole'	k'it ^h iməri	'end'

c. after a neutral stop⁷

c'. before a neutral obstruent

hət ^o ire	'trash'	t'a:lk ^o i	'strawberry'
nak ^o ine	'passenger'	k ^o ə:mɔ̯əp ^o -ha	'to stick'
p ^o ot ^o ik ^o i	'dwarf tree'	-	
s ^o æ:k ^o s'i	'girl'	s ^o öt'ik ^o i	'horsetail'

d. after an aspirated/tensed
segment

d'. before an aspirated/tensed
segment

k'ak'irak ^o i	'bits of rice'	k ^o u:lt'uk ^o	'chimney'
k'it ^h iməri	'end'	o:nt ^h oŋ	'whole'
s ^o öt'ik ^o i	'horsetail'	s ^o æ:k ^o s'i	'girl'
naph ^h it ^h allin	'naphthalene'	-	

⁵I would like to note that, in order to avoid the argument that consonantal sequences having zero (ə) pronunciation between them may be genuine clusters, we present words having a long vowel in the preceding nuclear position. Recall that a consonant after a long vowel cannot be syllabified into the rhymal position. Therefore, there must be a nuclear position between the two consonants in these words. At this stage, one may assume that the vowel [i] is not realised for some reason. Note that words containing a short vowel behave in like manner with respect to [i]-realisation.

⁶I note that a neutral obstruent alternates with its so-called 'voiced' counterpart, after a nasal (cf. Chapter 3).

⁷The zero realisation is impossible after fricatives and affricates, regardless of the following consonant (see next section). Therefore, the range of the discussion is restricted to neutral stops rather than to neutral obstruents.

Let us take a close look at each column and group in (9). Remarkably, the presence or absence of the high central vowel is predictable from the nature of the surrounding consonants. What is interesting is that the two columns show complementary phenomena: a nucleus which does not manifest [i], can express the vowel if the order of the surrounding consonants is reversed.

Firstly, the zero alternant is possible after a liquid (e.g. [k^oə:lle] 'dustcloth', [k^oo:lmok^o] 'alley', [t^aːlk^oi] 'strawberry', [k^ou:lt^uk^o] 'chimney'), whereas [i] cannot be absent before a liquid (e.g. [c^oinirəmi] 'fin', [hət^oire] 'trash', [mikⁱrəc^oi] 'to slip') except in the case of the so-called geminate (e.g. [k^oə:lle] 'dustcloth').

Secondly, if a nasal precedes the nucleus, the vowel [i] shows up only if the following segment is a liquid (e.g. [c^oinirəmi] 'fin'). The vowel is otherwise not audible (e.g. [t^oo:ŋnjaŋ] 'begging', [k^oə:mc^oəp^o-ha] 'to stick', [o:nt^hoŋ] 'whole'). If the nucleus is followed by a nasal, the vowel is suppressed if the preceding segment is a liquid (e.g. [k^oo:lmok^o] 'alley'), and [i] shows up otherwise (e.g. [nak^oine] 'passenger', [kⁱit^himəri] 'end').

Thirdly, when a neutral stop precedes the nucleus, the vowel [i] is not manifested before an aspirated or tensed consonant (e.g. [s^oæ:k^os'i] 'girl'), but is otherwise expressed (e.g. [hət^oire] 'trash', [nak^oine] 'passenger', [p^oot^oik^oi] 'dwarf tree'). If the order of the surrounding consonants is reversed, we get the opposite results except in the case where both consonants are neutral obstruents, that is, the zero alternant is found after a liquid (e.g. [t^aːlk^oi] 'strawberry') and a nasal (e.g. [k^oə:mɔ̌əp^o-ha] 'to stick'), but [i] must show up after a negatively charmed segment (e.g. [s^oötⁱik^oi] 'horsetail').

Finally, if an aspirated or a tensed consonant precedes the nucleus, the high central vowel must be manifested (e.g. [mik'irəc°i] 'to slip', [k'it^himəri] 'end', [s°öt'ik°i] 'horsetail'). As expected, if the order is reversed, we can get a sequence of two consonants (e.g. [k°u:lt'uk°] 'chimney', [o:nt^hoŋ] 'whole', [s°æ:k°s'i] 'girl'), except if both onsets contain an aspirated or a tensed consonant. This can be summarised below;

(10) [i] between two consonants

C1	C2	liquid	nasal	neutral obstruent	tensed or aspirated
liquid		ø	ø	ø	ø
nasal		i	ø	ø	ø
neutral stop		i	i	i	ø
ten./asp.		i	i	i	i

Let us now consider a case which is absent from table (10). It relates to the nuclear position after fricatives and affricates.

1.2.4 [i] after fricatives or affricates

As mentioned above, the nucleus after fricatives and affricates must have phonetic content even though the following consonant is either tensed or aspirated. Some examples are given below:

- (11) us°ik'waŋ 'funny' mes°ik'əp° 'to feel sick'
 həs°ikhⁱ 'husky' k°as°ip^hel 'gospel'
 ac°it^hæk° 'Aztec' s°ic°ik'i 'Japanese proper name'

With respect to these words, rather than making the generalisation that a nucleus between a neutral and a tensed/aspirated segment is not

interpreted as [i], I would like to claim that fricatives and affricates have a special property that other consonants do not have. This can be justified by observing neutral stops that appear in the same position as the fricative/affricate. There is no case where a nucleus manifests the vowel [i] between a neutral stop and a following tensed or aspirated consonant. Therefore, we must determine the special nature of the fricatives and affricates of Korean. If there is another explanation for why the nucleus after these segments must have phonetic content, this also should be determined.

We have so far discussed the presence and absence of [i] within a morphologically simplex word. I conclude this chapter on the phonological behaviour of [i] with a consideration of verbal suffixation.

1.2.5 [i] in verbal suffixation

Korean has a rich morphology. This property can be seen in verbal conjugations. That is, in an utterance, a verbal stem is always followed by at least one suffix. In certain cases, we find [i] between stems and suffixes. Note that no suffixes begin with a negatively charmed segment. Observe the examples in (12) below:

(12) [i] between stem and suffix

a. suffix: /s^oi/ (honorific)

mak ^o	[mak ^o is ^o i]	'to block'
c ^o ap ^o	[c ^o ap ^o is ^o i]	'to catch'
p ^o at ^o	[p ^o at ^o is ^o i]	'to receive'
p ^o ic ^o	[p ^o ic ^o is ^o i]	'to make'

k'ak'	[k'ak'is ^o i]	'to cut'
is'	[is'is ^o i]	'to be'
c'oc ^h	[c'oc ^h is ^o i]	'to chase'
nə:m	[nəmis ^o i] ⁸	'to go over'
s ^o in	[s ^o inis ^o i]	'to wear''
amur	[amus ^o i] ⁹ (~[amuris ^o i])	'to recover'
p ^h ur	[p ^h us ^o i] (~[p ^h uris ^o i])	'to solve'
k ^o a	[k ^o as ^o i] (*[k ^o ais ^o i])	'to go'
c ^o u	[c ^o us ^o i] (*[c ^o uis ^o i])	'to give'

b. suffix: /mjə/ 'and'

mak ^o	[mak ^o imjə]	'to block'
u:s ^o	[us ^o imjə]	'to laugh'
nak'	[nak'imjə]	'to fish'
p ^o æth	[p ^o æthimjə]	'to spit'
k ^o a:m	[k ^o amimjə]	'to roll'
s ^o in	[s ^o inimjə]	'to wear'
s ^o a:r	[s ^o a:lmjə] (~[s ^o arimjə])	'to live'
p ^h ur	[p ^h ulmjə] (~[p ^h urimjə])	'to solve'
k ^o a	[k ^o amjə] (*[k ^o aimjə])	'to go'
c ^o u	[c ^o umjə] (*[c ^o uimjə])	'to give'

c. suffix: /rə/ 'in order to'

mak ^o	[mak ^o irə]	'to block'
c'ic ^o	[c'ic ^o irə]	'to tear'
t ^o ak'	[t ^o ak'irə]	'to clean'
t ^o əp ^h	[t ^o əp ^h irə]	'to cover'
t ^o a:m	[t ^o amirə]	'to fill'
s ^o in	[s ^o inirə]	'to wear'
p ^h ur	[p ^h ullə] (~[p ^h urirə])	'to solve'
k ^o ə:r	[k ^o ə:llə] (~[k ^o ərirə])	'to hang'
k ^o a	[k ^o arə] (*[k ^o airə])	'to go'
c ^o u	[c ^o urə] (*[c ^o uirə])	'to give'

⁸Note that stem vowels undergo shortening if the following nucleus is filled. I do not explore this issue in this thesis. See Rhee (in preparation) for a detailed discussion.

⁹An independent process triggers the loss of /r/ before /s^o/ and /n/. I do not discuss this process in this thesis. The reader is referred to Huh (1982) for a detailed discussion.

As can be seen above, the vowel [i] is always expressed after a stem-final obstruent (e.g. [mak^ois^oi] 'to block (honorific)'). We also see that [i] is not realised after vowel-final stems (e.g. /k^oa/ 'to go' + /mjə/ 'and' --> [k^oamjə]). These are exactly the same as in the case of morphologically simplex words.

However, there are cases where [i]-realisation is inconsistent when comparing morphologically simplex words and verbal suffixations. Firstly, the vowel [i] is audible between nasals (cf. /s^oin + mjə/ 'to wear and' --> [s^oinimjə] (*[s^oinmjə])), and in sequences involving a nasal followed by a neutral obstruent (cf. /s^oin + s^oi/ 'to wear (honorific)' --> [s^oinis^oi] (*[s^oinzi])). Recall that the vowel [i] is not expressed in the same contexts in morphologically simplex words (cf. [kumnil] 'to stretch' and [t^oəmbi] 'to attack'). This is summarised in (13) below.

(13) Expression of [i] between nasals or between nasals and neutral obstruents:

- a. within a morphologically simplex word: NO (e.g. [kumnil] 'to stretch', [t^oəmbi] 'to attack')
- b. between verbal stem and suffix: YES (e.g. [animjə] 'to hug', [s^oinis^oi] 'to wear')

The fact that /r/-ending stems allow two different pronunciations is another point that we should discuss. In such cases, the the vowel [i] may or may not expressed after stem-final /r/. (cf. /p^hur + mjə/ 'to solve and' --> [p^hulmjə] ~ [p^hurimjə]). In morphologically simplex words, the vowel [i] is not expressed in the same context, as in /t^oarv^ok^ou/ [t^oalk^ou] 'to heat' and /jərv^omæ/ [jəlmæ] 'fruit'. In other

words, [riCV] never occurs in morphologically simplex forms. This is summarised in (14) below.

(14) Expression of [i] after /r/:

- a. within a morphologically simplex word: NO (e.g. [t°aløk°u] 'to heat', /jərv°mæ/ [jəlmæ] 'fruit', [k°ə:lle] 'dustcloth')
- b. between verbal stem and suffix: YES/NO (e.g. [p^hus°i] ~ [p^huris°i] 'to solve (honorific)', [s°a:lmjə] ~ [s°arimjə] 'to live + and', [p^hullə] ~ [p^hurirə] 'to solve + in order to')

We have so far discussed the data with respect to the presence and absence of [i] of Korean. What we can conclude is that Korean [i] does not behave arbitrarily, but appears and disappears systematically. Within a morphologically simplex words, it is generally controlled by the interaction of the presence or absence of the following vowel and the quality of the surrounding consonants. The only exception is the word-initial nuclear position. The generalisation may be extended to verbal conjugations but in a slightly modified manner.

Thus, the next task is to formally explain the above observation. Before attempting this, let us, in the following chapter, discuss the syllable structure of Korean .

Chapter Two

THE SYLLABLE STRUCTURE OF KOREAN

2.1 Introduction

In this chapter I will discuss the representation of Korean syllable structure. The purpose of this chapter is twofold: firstly, we must establish the syllabic inventory of Korean as one of the set of universally well-formed structures. Secondly, with respect to the discussion in this thesis, I show that any consonantal sequence in Korean is not genuine, but is mediated by an 'empty nucleus'¹.

This chapter is structured as follows: in 2.2, I present some previous proposals concerning Korean syllable structure. We will see that there is general agreement on that onsets do not branch, and rhymes and nuclei may branch.

On the other hand, we also see that there are some issues that authors disagree. The first concern about the syllable structure of Korean is the representation of a glide preceded by a consonant (e.g. /p^hjo/ and /k^owa/). Secondly, there is no agreement as to whether syllable structure should be built on the lexical representation (e.g. Kim-Renaud 1973, 1974, 1978, 1986), or on the surface form (Ahn 1985, Sohn 1987).

¹The empty nucleus refers to the nucleus dominating a point which has no segmental content.

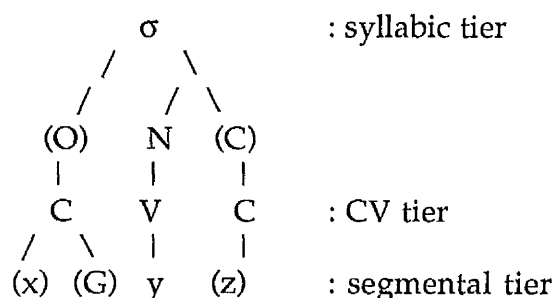
In 2.3, I introduce the syllable structure proposed by GP. This is followed by 2.4, where I describe Korean syllable structure in terms of the principles of GP. Arguments against the previous analyses will also be included. In this section, I claim that Korean does not allow branching rhymes. I argue for this claim with several pieces of evidence.

2.2 Previous proposals

2.2.1 Ahn's proposal

Ahn (1985) assumes that a syllable in Korean is composed of an optional onset consisting of a consonant and a glide (G), an obligatory rhyme consisting of a vowel, and an optional coda where only a single consonant can appear. This gives us the following syllable template for Korean, where C and V represent C- and V-slots respectively in the CV tier:² We note that this view is by and large the same as that of B.-Kun Lee (1982).

(1) Syllabic skeleton of Korean (Ahn 1985: 48)



²The CV tier is a prosodic template, composed of the slots of C and V that represent timing units of segments. It is referred to as the skeletal tier in other frameworks.

Ahn claims that a pure consonant³ can appear in the onset position, but no CC-cluster is allowed. This claim is based on surface forms which appear as the following: (K.-O, Kim & Shibatani 1976, taken from Ahn 1985: 47).

- (2) CV, CGV, CV, V, CVC, CGVC, GVC, VC (note: G indicates a glide)

As for the glides (cf. G in the structure (1)), Ahn claims that they link to an onset, and he provides the following two reasons: firstly, glides are optionally present in the syllable, and optionality is a property of the onset and coda, but not the nucleus. Secondly, by inserting glides under onsets, the assumption that only a vowel can be associated with a V slot (Ahn 1985: 49) is maintained. He further claims that a consonant and a following glide associate with a single C slot under the onset, as can be seen in (1) above. He thus claims that Korean does not allow branching onsets.

As for the syllabification of the post-nuclear consonant, Ahn claims that it will associate with the coda position unless a vowel follows it. This means that he allows branching rhyme constituents in syllable structures.⁴

We note that, since the above syllable structure in (1) is a representation of the surface syllable structure, he proposes several principles for syllabification, which I do not explore here, to get the final derivation from the underlying representation. Following Lexical Phonology, he assumes that syllabification applies at the beginning of

³It is not clear what is meant by 'pure consonant'.

⁴I return to this issue in more detail in the following section.

every stratum, immediately after the input of a morphological operation.

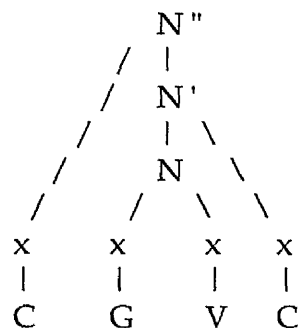
2.2.2 Sohn's proposal

Sohn (1987) has proposed the following syllable structure for Korean, see (3b) below, by adopting the model of syllable structure proposed by Levin (1984, 1985).

(3) a. notation

- i. $N'' \rightarrow (\text{spec}) N'$
- ii. $N' \rightarrow N (\text{spec})$
- iii. $N \rightarrow \text{syllable head}$

b. Syllable structure of Korean (Sohn 1987: 104)

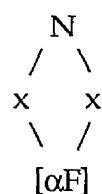


Sohn proposes the above syllable structure based on the fact that Korean allows maximally four segments within a syllable, which are ordered as a sequence of consonant-glide-vowel-consonant (e.g. [p^ojəl] 'star'). She thus claims that the onset and the coda can accommodate only a single consonant.

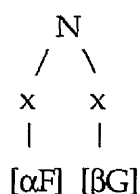
Sohn is also particularly keen on determining the syllabification of the glide. She proposes that the glide must belong to the nucleus rather than to the onset, for the following reasons: firstly, there are no cooccurrence restrictions between the two members of syllable initial clusters consisting of consonants followed by glides (e.g. [p^oəp^owən] 'court'); secondly, the glide only appears in prevocalic position (cf. *[p^oəp^oəwn]). She claims that if the glide is part of a non-vocalic constituent, it should freely appear both before and after vowels, i.e. in both the onset and coda positions.

As for the representation of glides, Sohn claims that they are nondistinct from vowels with respect to the featural representations, thus, "the term 'diphthong' refers to two distinct syllabic segments under a single nucleus node" (1987: 114). That is, both long vowels and diphthongs are underlyingly of the same structure in the sense that they equally associate to two skeletal points, as represented in (4) below.

(4) a. long vowel



b. diphthong



(where $\alpha, \beta = '+' \text{ or } '-'$, and $\text{F} \neq \text{G}$.)

As for the coda position, Sohn agrees with Ahn's proposal. That is, they posit the post-nuclear position (i.e. the so-called 'coda' position) for the post-vocalic consonant. This means that they allow branching rhyme constituents in their syllable structures. Therefore, unless a vowel follows, the post-vocalic consonant will associate with the rhymal position (e.g. /c^oip^o/ 'house').

They claim that the rhymal position of Korean syllable structure has certain restrictions. Firstly, it dominates only one C-slot (or skeletal point). Thus, an apparent word-internal consonant cluster (e.g. [s°alk°u] 'apricot') will occupy two distinct syllables. Note that they treat any consonant cluster as a genuine sequence. They also claim that the view that the rhymal position can accomodate only one position accounts for so-called 'double consonant simplification', whereby an underlying consonant cluster in word-final position reduces to a single consonant, unless a vowel-initial suffix is added (e.g. /ilk°/ 'to read': [ilc'a] or [ik°c'a] 'to read + let us' vs. [ilk°ə] 'to read + adverbial suf.'). They claim that Korean may underlyingly allow two consonants in final position, but one of the two consonants must be truncated from the coda C slot (or skeletal position) in the surface representation.

We have so far examined some previous analyses of Korean syllable structure. What is observed is that the two authors share the view that Korean does not allow branching onsets, but allows branching rhymes and nuclei. What is not agreed between the two authors is the syllabification and representation of the glides. Ahn (1985) (and Lee 1982) claim that they associate with an onset, and Sohn (1987) claims that they associate with a nucleus. Furthermore, the representation of the glide varies: while Sohn claims that it is dominated by a skeletal point (Sohn 1987), it does not have its own tier in the structure proposed by Ahn.

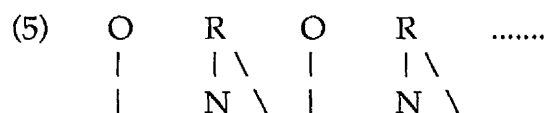
A word should also be said about the level at which syllable structure is established. While the above authors establish syllable structure based on surface form, there is a claim that syllable structure should be built on lexical representation (e.g. Kim-Renaud 1973, 1974, 1978, 1986). This disagreement about the level of syllabification gives us two different

types of syllable structure, according to the number of positions that the coda allows - one allows a single coda position, and the other, two coda positions.

My proposal for the syllable structure of Korean is different from these in various respects. Before detailing my arguments, let us consider the theory of syllable structure that GP proposes.

2.3 Syllable structure in GP

As mentioned in the Introduction, GP claims that a well-formed phonological representation consists of a set of Onset-Rhyme sequences, and the post-nuclear (i.e. rhymal) position is c-commanded by the nucleus, as in (5) below.



Constituents may or may not branch according to the parameter settings of a language. However, following the principles of Strict Directionality and Strict Locality, GP rejects any constituents that contain more than two positions (the Binariness Theorem).

Whether or not two positions can be sisters within a constituent is determined by the governing relation between them. Since governing relations are asymmetric relations that skeletal points enter into, one must be the head and the other the complement that must be governed by the head.

The segments along with the skeletal points contracting the governing relation must satisfy certain charm or complexity requirements.⁵ Along this line, GP claims that the well-formed syllable structure of a language is not established by the so-called 'relative sonority' of segments in the language (Kiparsky 1979, Steriade 1982, Selkirk 1982&1984, van der Hulst & Smith 1984, Giegerich 1985, Ito 1986, Hogg & McCully 1987, Parker 1989, Goldsmith 1990, Durand 1990 among others)⁶, but rather that it is the governing relation between adjacent positions that decides the correct syllabification.

2.3.1 The structure of well-formed onsets

Let us first consider well-formed onsets. GP allows branching and non-branching onsets, as shown in (6) below.

- (6) a. non-branching onset b. branching onset

O
|
x

O
/ \
x x

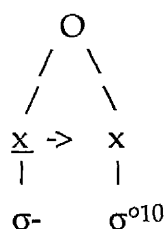
The structure (6a) represents a non-branching onset. Non-nuclear (either neutral or negatively charmed) segments can be associated to

⁵GP claims that all segments are either elements themselves or consist of a combination of elements (KLV 1985). This derives two important conclusions: firstly, segments are either charmed (positive (+) or negative (-)) or charmless (neutrally charmed (°)) according to the charm property of the elements they contain; and secondly, segments may differ in the number of elements they contain. These two parameters determine the governing relation between two positions: charmed segments may govern neutrally charmed segments (cf. KLV 1990: 202), and a neutrally charmed segment may govern another neutrally charmed segment if it is not less simplex than the other in terms of the number of elements it contains (cf. Harris 1990: 274).

⁶See Hogg & McCully (1987: 49-50), and Durand (1990) for the disadvantages of the sonority approach.

this position.⁷ Let us now consider the case of a branching onset (cf. (6b)). By examining the combinatorial conditions of consonantal sequences in word-initial position(s), we find that languages have very rigid constraints on their distribution. For instance, given a word-initial consonantal cluster C1 C2 in Spanish (Hooper 1976), the segments which can occur in C1 are *f, p, t, k, b, d, g* and nothing else; and *r* and *l* are eligible for the position C2.⁸ This ordered composition is impossible to reverse. This is more or less the same for English and other languages which allow consonantal clusters in word-initial positions. This composition is expressed, under GP theory, in such a way that the segment occurring in the C1 position is negatively charmed (⁻),⁹ with the other consonant being neutrally charmed (^o). The theory claims that the branching onset must have such a configuration because of the existence of government between two members. Therefore, the branching onset is formalised as below:

(7) branching onset



⁷As a rough approximation, certain obstruents and non-sibilant fricatives are negatively charmed, while glides, liquids, nasals and some obstruents are neutral (or charmless). No consonants are positively charmed. See Chapters 3&4 on the charm property.

⁸Note that /l/ does not appear after /t, d/.

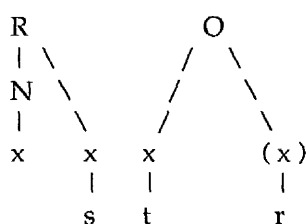
⁹This does not mean that all word-initial consonant sequences are onsets. See below (cf. footnote 11).

¹⁰We note that the neutral segment which can appear in the governed position in branching onset can contain at most two elements (cf. Harris 1990: 277). It is for this reason that nasals, which contain 3 (or 4) elements, cannot appear in a governed position, even though they are neutrally charmed. For a detailed discussion, see KLV (1990) and Harris (1990).

In this structure, the leftmost skeletal point, which is underlined, is the head of the configuration and dominates a negatively charmed segment. It governs its complement, occupied by a neutral segment. The most common word-initial sequences, such as /pl, pr, tr, kl, kr/, respect this configuration. GP claims that any true consonantal sequence (i.e. a sequence not separated by an empty nucleus) which respects this configuration, forms a branching onset.

There are two theoretical reasons for rejecting the hypothesis that initial /s/ + consonant (cf. [st]ool) and /s/ + consonant sequence (cf. [str]eet) are syllabified into a single constituent (Kaye 1992): the first reason, for which no further discussion is required, is that such syllabification, at least in the second example, violates the Binarity Theorem. Secondly, /s/ cannot license a following consonant, such as /p, t, k/, for /s/ does not have the charm value or complexity requirement needed in governing the following consonants: /s/ contains two elements and the following consonants are either negatively charmed or, if neutral, they contain at least three elements. The initial /s/ of such consonant clusters, therefore, cannot be a member of the same constituent as the remaining consonants, but must belong to an adjacent constituent.¹¹

¹¹KLV (1990) and Kaye (1992) show, with evidence from various languages, that the initial /s/ is associated with a post-nuclear (i.e. rhymal) position, and the following consonant sequences form a branching onset, as below:



2.3.2 The structure of well-formed nuclei

Let us turn to the nucleus. GP allows branching and non-branching nuclei, as shown in (8) below.

(8) a. non-branching nucleus

N
|
x

b. branching nucleus

N
/ \
x x

Let us first consider (8a). All vocalic (either positively charmed or neutrally charmed) segments can associate with this position.¹² GP allows branching nuclei in two cases: one manifests a heavy diphthong, and the other manifests a long vowel. In heavy diphthongs, positively charmed (+) segments (e.g. /a/) or complex neutral segments (e.g. /ɔ/)¹³ appear in the head position, and the complement position, which is governed by the head, is occupied by a simplex neutral segment (e.g. /ɪ/).¹⁴ Technically, a non-high vowel in the first term is followed by a high vowel in the second. Sequences like /aɪ/ and /aʊ/ are typical examples of this type of diphthong. Therefore, heavy diphthongs are expressed as head-initial. On the other hand, in the representation of a long vowel, a single segment occupies the two nuclear positions. Both structures are shown in (9).

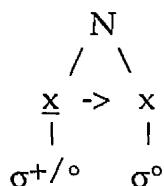
¹²Roughly speaking, the vowel /a/ and nasalised vowels are positively charmed, while all other vowels are neutral.

¹³Neutral segments can be divided into two groups, simplex and complex, according to the number of elements they contain. Simplex segments contain only one element, and complex segments contain more than one element.

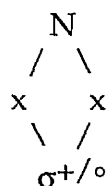
¹⁴Note that simplex segments consist of a single element, and complex segments consist of at least 2 elements.

(9) branching nuclei

a. heavy diphthong

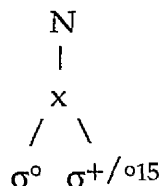


b. long vowel



A word should be said about the other type of diphthong, namely the light diphthong. Typical light diphthongs consist of a high vowel in the first term, and a non-high vowel in the second term (e.g. /ɪa/ [ja] and /ʊa/ [wa]). What is important with respect to the charm configuration is that light diphthongs do not have the representation in (9a). That is, the first member of the light diphthong is not positively charmed. Therefore, the representation of the light diphthong is distinct from that of the heavy diphthong. If this were not the case, light diphthongs such as /ɪa/ and /ʊa/ would occupy two skeletal points, like long vowels and heavy diphthongs, and so one would not be able to account for their quite distinctive behaviour. In terms of stress, for instance, the light diphthong behaves like a short vowel, and the heavy diphthong, like a long vowel. For this reason, GP claims that a light diphthong has the representation in (10) following, where two segments associate with a single skeletal point.

(10) light diphthong



¹⁵When both segments are neutral (cf. /ui/), the right member must be simplex.

(12) a. vowel-initial syllable: /ami/ 'friend'

O ¹⁶	N	O	N
x	x	x	x
a	m	i	

b. a sequence of adjacent nuclear positions: /piadɑ/ 'joke'¹⁷

O	N	O	N	O	N
x	x		x	x	x
p	i		a	d	ɑ

The other type of onset constituent (i.e. the onset that dominates a skeletal point but no associated phonological content) can be found in words which phonologically behave as if they began with a consonant, though they apparently begin with a vowel.¹⁸

¹⁶In compounds, the empty onset may associate with a consonant if the preceding word contains a floating segment at the end. In French, for instance, the final /t/ of the word /p(ə)tit/ 'little' is recognised as a floating segment by various authors (e.g. Vergnaud (1982), Clements & Keyser (1983), Encrevé (1988)). When this word is added to the consonant-initial word, say, /ku/ 'neck', the floating consonant is not realised, as in [p(ə)tiku] 'little neck'. However, when the word is added to the vowel-initial word, say, /ami/ 'friend', the floating /t/ associates with the initial empty onset of the word /ami/, thus is audible as in [p(ə)titami].

O	N	O	N		O	N	
x	x	x	x		x	x	
p	(ə)	t	i	t	k	u	[p(ə)tiku]

O	N	O	N		O	N	O	N	
				/					
x	x	x	x	(x)	x	x	x	x	
				/					
p	(ə)	t	i	t		a	m	i	[p(ə)titami]

See Vergnaud (1982) and Charette (1990a) for a detailed discussion.

¹⁷This is a context that may be subject to OCP, since two identical units are adjacent. See Da Silva (1992a&b) for a detailed discussion on the phonological processes between nuclear positions.

¹⁸The discussion on this type of empty onset can be found in Clements & Keyser (1981), Marlett & Stemberger (1983), Vergnaud (1982) and Charette (1991a).

As for the empty nucleus constituent, GP claims that a nucleus always dominates a skeletal point, as below in (13b). Following the Licensing Principle, all phonological positions save the domain head must be licensed within a domain. The onset constituent is licensed by the following nucleus at the skeletal level. This means that the nucleus has the property of licensing by virtue of having a skeletal point.

- (13) a. * N
 b. N
 |
 x

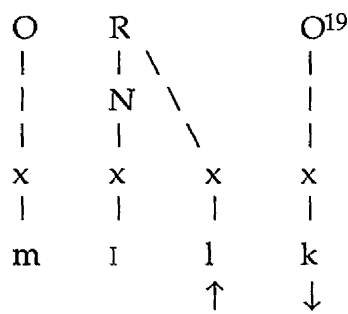
2.3.4 The structure of well-formed rhymes

The final type of branching configuration is that of the branching rhyme. This structure consists of a short vowel which is followed by a consonant. Needless to say, any vocalic segment can appear in the nuclear position, thus, no particular charm property is required here. Since the nuclear position in a branching rhyme can dominate only a short vowel (recall the Binararity Theorem), a consonant following a long vowel is syllabified into the following onset (cf. 14a), rather than into a rhymal position (cf. 14b).

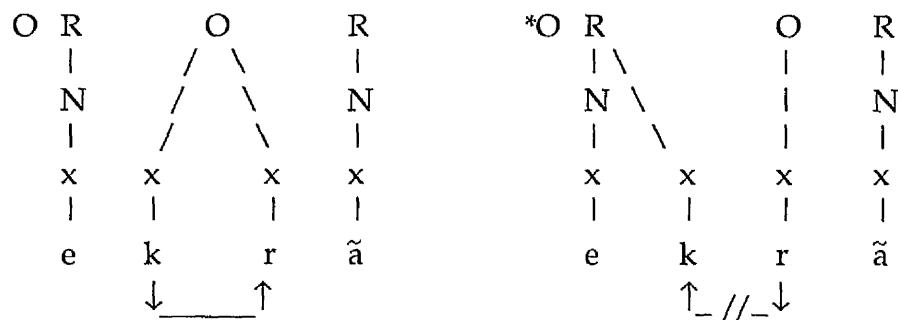
- (14) a. R O
 | |
 N |
 / \ |
 x x x
 \ / |
 σ σ
- b. * R
 | \
 N \
 / \ \
 x x x
 \ / |
 σ σ

GP cites the 'Coda Licensing Principle' in accounting for the post-nuclear position within a branching rhyme. This states that post-nuclear positions must be licensed by a following onset, and is motivated by the fact that, in many languages, the rhymal position is considerably restricted as to its permitted segmental content. Based on such empirical evidence, GP claims that, given a consonant sequence, whether a consonant is syllabified into a rhymal position or into a following onset position is determined by the direction of government between the two consonants. Concretely, the rhymal position requires a neutral segment which is governed by a consonant in a following onset. This is illustrated by the English word 'milk' and the French word /ekrã/ 'screen', in (15) below.

(15) a. /milk/



b. /ekrã/ 'screen'



¹⁹This structure is not yet complete. I return to it shortly.

In (15a), the first consonant of the sequence /lk/ associates with the rhymal position, since it is neutral and is governed by the following /k/. On the other hand, the sequence in (15b) forms constituent rather than interconstituent government (see below), because /k/ governs the following consonant /r/.

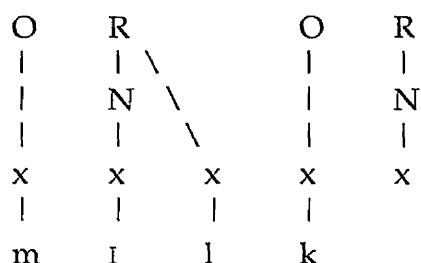
The governing relation between a post-nuclear position and the following onset forms a relation of 'interconstituent government'. Since the two segments occupy two different constituents, we may expect a rather different governing relation to that of constituent government. In fact, there are two points of difference: firstly, any neutral consonant, including nasals, can appear in the post-nuclear position; and secondly, the following onset need not be negatively charmed. Concretely, the head can be occupied by either a negatively charmed segment (C^-), or by a neutrally charmed (C^0) segment if it is not less simplex than the preceding one in terms of the number of elements it contains.²⁰

What we should be aware of is the fact that the post-nuclear position cannot appear without a following onset to govern it. Thus, a coda is not allowed in word-final position. An apparent word-final consonant is syllabified into an onset and is followed by an empty nucleus. Recall that all phonological domains must end in a nucleus (cf. the 'Licensing Principle' in the Introduction). Therefore, the word 'milk' is represented as /milkv⁰/, and is syllabified as below in (16). Note that /v⁰/ indicates the empty nucleus.

²⁰GP provides the following segmental complexity hierarchy of neutral segments (KLV 1990: 219):

segments:	{glides, r} < 1 < nasals
no. of elements:	1 2 3(or 4)

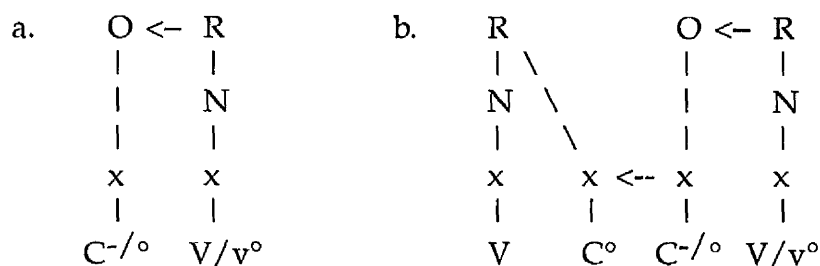
(16) /mɪlkv°/



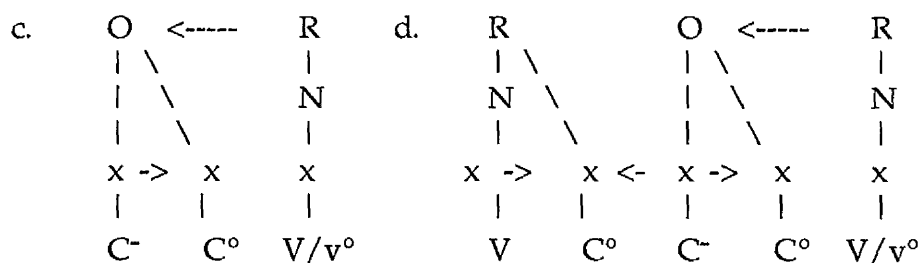
2.3.5 Summary

In this section, I have discussed the possible constituents and well-formed syllable structures of human languages within the framework of GP. Constituents²¹ are maximally binary branching, and sequential constraints are determined by the government between two segments. This is summarised in (17) below.

(17) well-formed syllable structures



²¹Note that the 'syllable' itself is not a constituent (KLV 1988, Charette 1988, 1991a). Brockhaus (1992: 117) provides two reasons for this: theory-internally, it would be anomalous in being the only right-headed constituent, given that each nucleus governs the immediately preceding onset; and theory-externally, there is no conclusive evidence for the existence of such a constituent.



It should be noted that the syllable structure of any human language must confirm to these permitted configurations. Not every language exhibits all the structures above. Actually occurring structures vary parametrically from one language to another. For instance, French allows all the structures in (17) above (cf. [mɔ̃str] 'monster' in (17d)); but the structures (17c&d) cannot be found in English if the final nucleus is empty (cf. [tru:] 'true' and [əstreɪ] 'astray', but *[etr] and *[əstr]). As we shall see below, Korean does not permit (17b, c&d) at all.

Finally, a word should be said about the process of resyllabification. Based on the Projection Principle, GP does not allow resyllabification.

(18) Projection Principle (KLV 1990: 221)

Governing relations are defined at the level of lexical representation and remain constant throughout a phonological derivation.

Following this principle, there is no modification of governing relations formed at the level of the underlying representation until the final stage of the derivation is reached. It follows from this that GP precludes any change of syllable structure that is formed at the level of the underlying representation.²² What is allowed in GP is the

²²An early comment by Selkirk (1982: 356f), makes the same point:

We will not assume that the principles of BSC [basic syllable composition/YH] 'apply', in the sense that they participate in a phonological derivation, converting a phonological derivation. Rather, we think of them as well-formedness conditions

strengthening or weakening of a governing relation. Thus, it is claimed in GP that "segmental phonology is composition and decomposition." (KLV 1985).

Comparing GP with theories which allow resyllabification, although both frameworks may account for a process, GP is more constrained because of the Projection Principle, and is thus superior.²³

on underlying phonological representation, which thus is to be thought of as having syllable structure.

Steriade (1988: 271) also states that "all foot construction respects preexisting constituents".

²³The reader is referred to Rice (1989) for a detailed discussion of eliminating resyllabification.

2.4 The syllable structure of Korean

In this section, I discuss the syllable structure of Korean. In the discussion, I discuss some issues arising from previous works, on which I disagree, and argue the points in favour of Charm and Government Theory. Since I agree with the claim that Korean does not allow branching onsets, but allows branching nuclei, I only consider the syllabification of glides and of post-nuclear consonants (i.e. the existence of a rhyml position). Based on this discussion, general aspects of the syllable structure of Korean will be demonstrated at the end of the section.

2.4.1 The syllabification of the glide

This section discusses the representation of prevocalic glides in Korean (e.g. /k^owa/ 'and' and /jaŋ/ 'sheep'). We will refer to these forms as iV and uV sequences²⁴, where V stands for any vowel. In 2.2, we saw two different proposals concerning the representation of glides and their syllabification. Firstly, Sohn (1987) claims that glides belong to the nucleus, and they associate with a skeletal point distinct from the following vowel (cf. 19a). Ahn (1985), on the other hand, claims that glides associate with an onset without its own skeletal point, i.e. to a complex segment. (cf. 19b).

²⁴Following the internal representations of the segments, i and u will be represented as I^o and U^o respectively.

- (19) a.
$$\begin{array}{c} \text{N} \\ / \quad \backslash \\ \text{x} \quad \text{x} \\ | \quad | \\ \text{I}^\circ/\text{U}^\circ \quad \text{V} \end{array}$$
- b.
$$\begin{array}{cc} \text{O} & \text{N} \\ | & | \\ \text{x} & \text{x} \\ / \quad \backslash & | \\ \text{C} \quad \text{I}^\circ/\text{U}^\circ & \text{V} \end{array}$$

The problem concerning the glide is thus twofold:

- (20) a. does the glide have its own skeletal point?

- b. which constituent does it associate with?

In answering the above two questions, there are four possibilities for the syllabification of the glide and its neighbouring segment²⁵:

- (21) a.
$$\begin{array}{cc} \text{O} & \text{N} \\ | & | \\ \text{x} & \text{x} \\ | & / \quad \backslash \\ \text{C} & \text{I}^\circ/\text{U}^\circ \quad \text{V} \end{array}$$
- b.
$$\begin{array}{cc} \text{O} & \text{N} \\ | & | \\ \text{x} & \text{x} \\ / \quad \backslash & | \\ \text{C} \quad \text{I}^\circ/\text{U}^\circ & \text{V} \end{array}$$
- c.
$$\begin{array}{cc} \text{O} & \text{N} \\ / \quad \backslash & | \\ \text{x} \quad \text{x} & \text{x} \\ | \quad | & | \\ \text{C} \quad \text{I}^\circ/\text{U}^\circ & \text{V} \end{array}$$
- d.
$$\begin{array}{cc} \text{O} & \text{N} \\ | & / \quad \backslash \\ \text{x} & \text{x} \quad \text{x} \\ | & | \quad | \\ \text{C} & \text{I}^\circ/\text{U}^\circ \quad \text{V} \end{array}$$

(21a) illustrates the structure in which glide-vowel sequences form a light diphthong. In this structure, the preceding onset dominates a consonant only. In (21b&c), the glides associate with an onset position. In these structures the following nucleus dominates a vowel only. What is different between the two structures is that (21b) represents the non-branching complex onset in which the glide together with the preceding consonant associates with a single skeletal point. This is what Ahn (1985) claimed. On the other hand, (21c) illustrates a branching onset structure in which the glide associates with the

²⁵Yoshida (1991) and Da Silva (1992a&b) have discussed the same issue in a similar way.

governed position. Finally, (21d) illustrates a branching nucleus in which the glide-vowel sequence associates to two distinct skeletal points. This is what Sohn (1987) claimed.

Among these four possibilities, we can easily exclude (21d) from consideration, because it violates the governing requirement of a branching nucleus. Concretely, in a well-formed heavy diphthong, the left member, which is the head (or the governor) may contain either a positively charmed segment, or a complex segment, and the right member, which is the complement (or the governee), must be filled with a simplex neutral segment. Thus, a heavy diphthong cannot be iV/uV, but must be Vi/Vu, as in English [praɪd] 'pride'.

We also exclude the branching onset hypothesis in (21c) from the following data given in (22) below.

(22)	k ^o wa	'and'	k ^o jul	'orange'
	p ^o wa	'look!'	p ^o jə	'bone'
	t ^o wæc ^o i	'pig'	t ^o it ^o jə	'step!'
	c ^o wi	'mouse'	k ^o ac ^o jə	'have (it)!'
	s ^o wæt ^o o	'rush'	mjo	'grave'
	s ^o unjə	'nun'	p ^o irjo	'manure'

From the above examples, we see that there are no restrictions on which consonant can precede the glide. This is never the case for the head of a branching constituent. Therefore, the correct configuration of the glides will be either (21a) or (21b), which are repeated in (23) below.

(23)	a.	O	N	b.	O	N
		x	x		x	x
			/ \		/ \	
		C	I ^o /U ^o V		C I ^o /U ^o	V

2.4.1.1 Two different types of glide-vowel sequences

In this section, I will discuss the syllabification of the glides with respect to the two representations in (23) above.

In considering the syllabification of the glide-vowel sequence, it should be noted that Korean manifests two types of glide-vowel sequences. One type allows alternative forms where the glide is realised as a high vowel, as in (24a), while the other does not allow such alternants, as in (24b).²⁶

(24) a. glides that alternate with a high vowel²⁷

[p ^o wəs ^o ə]	~	[p ^o uəs ^o ə]	'to pour + because'
[t ^o wəs ^o ə]	~	[t ^o uəs ^o ə]	'to put + because'
[c ^o wəs ^o ə]	~	[c ^o uəs ^o ə]	'to give + because'
[k ^o jəs ^o ə]	~	[k ^o iəs ^o ə]	'to crawl + because'
[m ^o jəs ^o ə]	~	[miəs ^o ə]	'to tear + because'
[c ^o jəs ^o ə]	~	[c ^o iəs ^o ə]	'to carry + because'
[k ^o as ^o jo]	~	[k ^o as ^o io]	'to go + imperative suf.'

b. glides that do not alternate with a high vowel

[wat ^o il]	'shivering'	[k ^o wa]	'and'
[wənak ^o]	'originally'	[hwəls'in]	'very'
[wi]	'above'	[c ^o wi]	'mouse'
[wæ]	'why'	[t ^o wæc ^o i]	'pig'
[jak ^o]	'medicine'	[p'jam]	'cheek'
[jəlmæ]	'fruit'	[p'jə]	'rice plant'
[jori]	'cooking'	[mjo]	'grave'
[juri]	'glass'	[k ^o jul]	'orange'

²⁶I borrow Da Silva's (1992a&b) idea for this discussion.

²⁷Examples are taken from Yoo (1985b).

In the following pages, I argue that the glide-vowel sequences in (24a) are derived from a sequence of nuclear positions forming a light diphthong. As for the glide-vowel sequences in (24b), I would like to claim that the glide and the following vowel form a light diphthong. Let us call glides of this type 'lexical glides'. Let us first consider (24a).

2.4.1.2 The phonological representation of glides that alternate with a high vowel

In the above, I claimed that the words in (24a), where a glide has an alternative pronunciation, are (i) derived from a sequence of nuclear positions, and (ii) involve a light diphthong. The first claim can be justified by the fact these words are the concatenation of two morphemes. For clarity, we repeat the examples below in (25).

(25)	[p ^o wəs ^o ə]	~	[p ^o uəs ^o ə]	'to pour + because'
	[t ^o wəs ^o ə]	~	[t ^o uəs ^o ə]	'to put + because'
	[c ^o wəs ^o ə]	~	[c ^o uəs ^o ə]	'to give + because'
	[onwi]	~	[onui]	'brother and sister'
	[p ^o ak'wi]	~	[p ^o ak'ui]	'to change (causative)'
	[k ^o jəs ^o ə]	~	[k ^o iəs ^o ə]	'to crawl + because'
	[m ^o jəs ^o ə]	~	[m ^o iəs ^o ə]	'to tear + because'
	[c ^o jəs ^o ə]	~	[c ^o iəs ^o ə]	'to carry + because'
	[k ^o as ^o jo]	~	[k ^o as ^o io]	'to go (imperative)'
	[has ^o ju]	~	[has ^o iu]	'to do (imperative)'

In order to justify the second claim that the glide-vowel sequences in (25) form a light diphthong, as distinct from an analysis whereby the glide, together with the preceding consonant, forms the non-branching

complex onset constituent, we adopt the following criterion in (26) proposed by Da Silva (1992b: 73) for the corresponding contexts.

- (26) Complex segments [i.e. non-branching complex constituents /YH] present restrictions with respect to the segment material, which may occupy their skeletal position

The data in (25) show that the glides can be preceded by any of the consonants found in Korean. In particular, we see that [w] and [j] can be preceded by [p^o] and [c^o] respectively (e.g. [p^owəs^oə] 'to pour' and [c^ojəs^oə] 'to carry'). Notice that they share the elements U^o and I^o respectively. The fact that no segmental restriction is imposed on consonant-glide sequences implies that the two segments are not associated to the same skeletal point. However, we see that there are certain restrictions on the glide and the following vowel. That is, [w] can be followed only by [ə] or [i], and [j] can be followed by [ə] or [o] and [u]. No other vowel can be preceded by the glides. Therefore, the glides in (25) cannot be members of a non-branching onset, but form a light diphthong with the following vowel, as shown in (27).

- (27) /c^oi + As^oə/ [c^ojəs^oə] ~ [c^oiəs^oə] 'to carry + because'²⁸

O	N		O	N	O	N	
x	x	+	x	x	x		⇒⇒⇒
c ^o	I ^o		ə	s ^o	ə		

²⁸The verbal suffix /A/ is realised either as [a] or [ə] according to the nature of the stem vowel (cf. S.-J. Chung (1994)).

O	N	O	N	
x	x	x	x	
	/ \			
c ^o	I ^o ə	s ^o	ə	[c ^o jəs ^o ə]

2.4.1.3 The syllabification of lexical glides

In this section, I discuss the syllabification of the lexical glides [j] and [w] with respect to the two representations in (23) above. In the following pages I claim that the two glides associate with a nucleus, forming a light diphthong.

The first piece of evidence for the claim that the representation of the glide-vowel sequence of Korean cannot be (23b) but (23a) comes from the fact that there are systematic constraints on what vowel can follow the consonant-glide sequence. Consider the following examples in (28) below.

(28) a. [w] cannot be followed by [o] or [u]

/wa/	[k ^o wail] 'fruit'	[c ^o wa] 'left'	[hwal] 'bow'
/wə/	[mwəl] 'what'	[hwəls'in] 'very'	[p ^o əp ^o wən] 'court'
/wi/	[t ^o wi] 'back'	[c ^o wi] 'mouse'	[nwi] 'sister'
/wæ/	[t ^o wæc ^o i] 'pig'	[s'wæk ^o i] 'wedge'	
/we/	[mwe] 'mountain'	[k'wemæ] 'to sew'	

b. [j] cannot be followed by [i] or [e], and [æ]

/ja/	[p'jam] 'cheek'	[k ^o jarim] 'long'	
/jə/	[p ^o jə] 'rice plant'	[hjə] 'tongue'	[sonjə] 'girl'
/ju/	[k ^o urju] 'detention'	[kjul] 'orange'	[hjuk ^o a] 'leisure'
/jo/	[mjo] 'grave'	[phjo] 'ticket'	

As can be seen in (28) above, there are systematic constraints between the glide and the following vowel. That is, the vowels /i/, /e/ and /æ/ cannot immediately follow the palatal glide (i.e. *[p^oje]), and the vowels /u/ and /o/ cannot follow the labial glide (i.e. *[k^owo]).

The second piece of evidence comes from the [r] ~ [l] alternation (C.-W. Kim & H.-Y. Kim, 1991: 141, cited in Rhee 1993). In Korean, [r] occurs between two filled nuclei, and [l] occurs elsewhere, as shown in (29) below.

- | | | |
|------|---------------------------|-----------------------------|
| (29) | [mul] 'water' | [muri] 'water (nominative)' |
| | [multo] 'water + as well' | [mure] 'water + at' |

Let us now consider compounds, in which the first word ends in a liquid and the second word begins with a lexical glide.

- | | | |
|------|--|--------------------|
| (30) | [ir-joil] (*[il-joil]) | 'Sunday' |
| | [s ^o ər-ja] (*[s ^o əl-ja]) | 'snow-night' |
| | [p ^h ar-wəl] (*[p ^h al-wəl]) | '8-month (August)' |
| | [chir-wi] (*[chil-wi]) | '7th grade' |

The fact that the liquid is realised as [r] shows that it is followed by a nucleus, with which the glide and the following vowel associate.

We have so far discussed the syllabification of the lexical glides of Korean. What we have seen is that the glides together with the following vowel form a light diphthong. Let us now move onto the issue of branching rhymes.

2.4.2 Does Korean allow branching rhymes?

To my knowledge, no one has argued against the hypothesis that Korean has branching rhymes. This follows from the fact that, firstly, Korean allows apparent consonantal clusters after short vowels, such as in [k'alt'æk°i] 'funnel'; and secondly, some words contain double consonants in final position, as in [mulk°-əs°ə] 'be watery + because'.²⁹ The standard view (e.g. Ahn 1985) claims that the first consonant of the cluster associates with a rhymal position, and the following consonant associates with the following onset.

However, there are factors that make the branching rhyme view suspect. The first argument concerning the branching rhyme is derived from the fact that Korean abounds with words containing a long vowel followed by an apparent consonant cluster.

(31) V:CC

[k°o:lmok°]	'alleyway'	[ə:lma]	'how much'
[ma:ls'əŋ]	'trouble'	[t'a:lk°i]	'strawberry'
[t°a:nc ^h u]	'button'	[ə:mp ^h o]	'threat'
[mo:p°s'i]	'very'	[a:ngæ]	'fog'
[t°a:mbæ]	'cigarette'	[t°o:ŋnjaŋ]	'begging'
[i:mgim]	'king'	[o:nt ^h oŋ]	'whole'

This is not paralleled in other languages which are believed to have genuine branching rhymes. For instance, it is claimed that a well-formed postvocalic cluster (e.g. /lk/) cannot follow a long vowel in Dutch (van der Hulst & Smith 1984: 39) or in French (Charette 1992),

²⁹There are around 50 words which contain double consonants. In this type of word, both consonants are pronounced when vowel-initial suffixes are added, but one consonant is lost when no suffix follows, or certain consonant-initial suffixes are added. See Chapter 5 for a detailed discussion on double consonant simplification.

and this is by and large the case in other languages which allow branching rhymes.

This property can be captured naturally in the theory of GP. Recall that a consonant is syllabified into the rhymal position if it is governed by a following consonant (cf. the Coda Licensing Principle). In other words, given a consonantal sequence, the preceding consonant is forced to associate with the rhymal position under government by the following consonant. In this case, the preceding vowel must be short so as not to violate the Binariness Theorem. Therefore, it is quite natural that, in languages which allow branching rhymes, the sequence *V:CC where the second member of the cluster governs the preceding one cannot be found or is very rare. Put another way, if a language abounds with sequences of the type of V:CC, it is very dubious that a branching rhyme is present. Korean belongs to this type of language.

My second argument concerns the fact that languages which allow branching rhymes have constraints between nasals and following obstruents. In English, for instance, it is usually the case that such sequences are homorganic (e.g. ca[mp], fi[n]gler and te[nt]) if two consonants form a genuine cluster.³⁰

Let us now consider the case of Korean. If this language allows branching rhymes, we may not find heterorganic sequences of nasal+obstruent after a short vowel in morphologically simplex

³⁰We acknowledge that the homorganic constraint may or may not hold in suffixation. On the one hand, we have 'i[m]possible' (*i[n]possible'), where the prefix-nasal assimilates to the following consonant; and we have 'u[n]pæk (*u[m]pæk)' on the other hand, where the preceding nasal does not assimilate to the place of articulation of the following obstruent. GP claims that this is a matter of analytic/non-analytic suffixation (cf. Chapter 5).

words.³¹ However, as can be seen in (32), Korean abounds with such sequences.

(32)	[p ^o əŋgæ]	'lightning'	[t ^o əŋɡol]	'customer'
	[s ^o ɪŋɡirjo]	'shoe repairer'	[k ^o ənbaŋ]	'be arrogant'
	[s ^o ənbi]	'scholar'	[t ^o ənbak ^o]	'right now'
	[s ^o amga]	'be discreet'	[s ^o əmgi]	'to serve'
	[amɡu]	'to tempt'	[momzo]	'personally'
	[əmɕʒi]	'thumb'	[næmzæ]	'smell'
	[t ^o oŋbæ]	'sharing jobs in hunting'	[əŋbət ^h im]	'be wide'
	[t ^o oŋbu]	'bean flower'	[c ^o əŋdori]	'hammer'
	[æŋdu]	'cherry'	[məŋzək ^o]	'mat'

The above discussion leads us to claim that Korean does not allow branching rhymes, and any apparent consonant cluster is, in fact, mediated by an (empty) nucleus.

Let us now consider words (or stems) containing final double consonants. Recall that we lose one of the two consonants when no suffix follows, or certain consonant-initial suffixes are added, and both consonants are pronounced when vowel-initial suffixes are added (cf. Chapter 5). If our prediction that Korean does not allow branching rhymes is correct, the two consonants are not a genuine cluster but are separated by an empty nucleus. This may be confirmed in two ways. Firstly, some words contain a long vowel.

(33)	stem	stem + /As ^o ə/ 'because'	stem + /k ^o o/ 'and'
	/s ^o a:rv ^o mv ^o /	[s ^o almas ^o ə]	[s ^o a:mk'o]
	'to boil'		
	/t ^o a:rv ^o mv ^o /	[t ^o almas ^o ə]	[t ^o a:mk'o]
	'to resemble'		

³¹Morphologically simplex words refer to the words where no suffixes are involved. Thus, they are unanalysable in phonological and morphological point of view. See Kaye (1993) for a detailed discussion.

/o:rv°mv°/ 'to infect'	[olmas°ə]	[o:mk'o]
/t'ə:rv°p°v°/ 'be astrigent'	[t'əlp°əs°ə]	[t'ə:lk'o] or [t'ə:p°k'o]
/jə:rv°p°v°/ 'be thin'	[jəlp°əs°ə]	[jə:lk'o] or [jə:p°k'o]
/ə:p°v°s°v°/ 'not to be'	[əp°s°ə]	[ə:p°k'o]
/ma:nv°hv°/ 'be plenty'	[man(h)a]	[ma:nk ^h o]

The above words show that the stem vowel is realised as long when a consonant-initial suffix is added, and as short when a vowel-initial suffix is added. If a putative vowel lengthening process applies before a consonant-initial suffix, the word /c°ip°v°/ 'to pick' must be realised as *[c°i:p°k'o] rather than as [c°ip°k'o], which is, in fact, the attested form. Therefore, the above words must contain a long vowel underlyingly, and shortening occurs before a vowel-initial suffix. Since the words in (33) contain a long vowel, the following consonant cannot associate with the rhymal position, but instead associates with an onset followed by an empty nucleus, as shown in the lexical representation. Therefore, the two consonants in the above examples do not form a genuine sequence.

Secondly, some words can be related to earlier forms. The following words are confirmed by the diachronical and/or synchronical research of many Korean scholars (e.g. K.-M. Lee 1978) to be morphologically complex, i.e. they are derived verbs (cf. 34a) or nouns (cf. 34b).

(34) a. derived verbs: stem + /As°ə/ 'because', /c°i/ (interrogative)

[p°ulk°əs°ə], [p°ulc°i] (or [p°uk°c°i])	
/p°urv°k°v°/ 'be red' ⇐ /p°urv°/ 'fire'	
[p°alp°as°ə], [pa:lc°i] (or [p°a:p°c°i])	
/p°a:rv°p°v°/ 'to step' ⇐ /p°a:rv°/ 'foot'	
[mulk°əs°ə], [mulc°i] (or [muk°c°i])	
/murv°k°v°/ 'be watery' ⇐ /murv°/ 'water'	

b. derived nouns: stem + /i/ (nominative suffix), /t°o/ 'as well'

[s°a:lmi], [s°a:mt°o]	
/s°a:rv°mv°/ 'life' ⇐ /s°a:rv°/ 'to live'	
[a:lmi], [a:mt°o]	
/a:rv°mv°/ 'knowledge' ⇐ /a:rv°/ 'to know'	

Since the words in the left column are derived from the ones in the right, the second consonant must be suffixed. I claim that the suffix forms a separate phonological domain from the stem, as in the case of the English [[peep]ed].³² This follows from the fact that vowel length is still maintained in the derived forms. Therefore, the above double consonants are in fact separated by a domain-final empty nucleus.

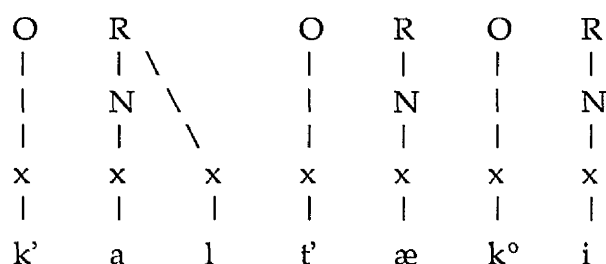
Even though not all possible double consonant sequences are attested, we may still claim that such words are morphologically complex. In fact, some phonologists (e.g. P.-S, Lee 1982, 1985) claim that Old Korean is a CV type of language.

I have so far argued in favour of the claim that Korean has no branching rhymes. Let us now further justify this claim with evidence from the distribution of the segment /r/.

³²See Chapter 5 for a detailed discussion of suffixation.

For a discussion, let us take the word [k'alt'æk°i] 'funnel'. Following the standard theory, this word has a branching rhyme as below in (35), where [l] associates with a rhymal position and the following consonant /t'/ attaches to the following onset.

(35) [k'alt'æk°i] 'funnel' (standard version)



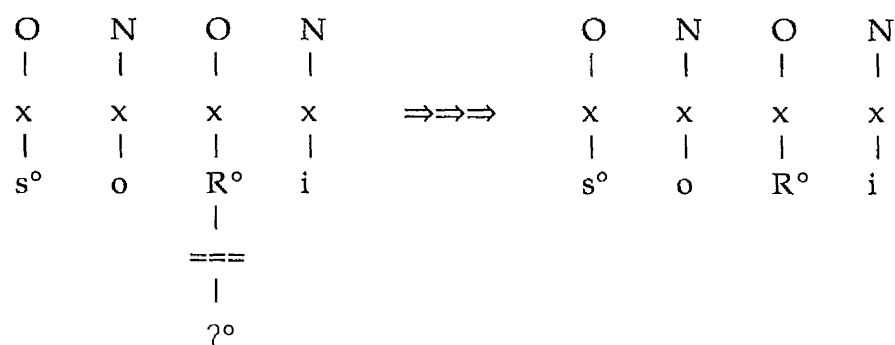
It seems that this structure respects all parameters of syllabification provided by GP: the consonant /t'/ in the second onset position is negatively charmed and it can govern the preceding neutrally charmed segment [l], etc.

The argument starts from the fact that the liquid has a distributional constraint: it is realised as [l] when it appears word-finally (cf. [mal] 'horse') and before another consonant as above, and it is realised as [r] if it appears in inter-vocalic position (cf. [s°ori] 'sound'). In such circumstances, we need to decide the directionality of the process. Which segment is the underlying representation, and which is the variant? If we take /l/ as the underlying representation, an explanation is required for the alternation /l/ --> [r] in inter-vocalic position, and if /r/ is taken as the underlying representation, we should explain the appearance of [l] in word-final and pre-consonantal positions.

Let us first consider /l/ as the underlying representation. In this case, the word 'sound' is lexically represented as /s°oli/, and is realised [s°ori]: /l/ is lenited to [r]. This is shown in (36). Note that /l/ is derived

by the combination of the coronal element R° and the occlusion element ?° .

(36) /s[°]oli/ [s[°]ori] 'sound'



The derivation in (36) seems quite natural, because lenition can be observed in Korean as well as in many other languages. For instance, in Korean, $t^\circ (= R^\circ + \text{?}^\circ + h^\circ)$, and $p^\circ (= U^\circ + \text{?}^\circ + h^\circ)$, vocalise to [r] and [w] respectively between vowels (e.g. /k[°]ə:t[°]v[°] + əs[°]ə/ 'walk + because' --> [k[°]ərəs[°]ə] and /k[°]o:p[°]v[°] + əs[°]ə/ 'pretty + because' --> [k[°]owas[°]ə])³³. However, there is a crucial fact which leads us to claim that vocalisation of the liquid is inconsistent with that of /t[°]/ and /p[°]/. That is, lenition of the latter consonants applies only if the stem vowel is long. Vocalisation cannot be found when the stem contains a short vowel. For instance, a verbal stem such as /k[°]ə:t[°]v[°]/ 'to collect' and /k[°]op[°]v[°]/ 'numb', which contain a short vowel, do not undergo lenition, thus, they are respectively realised as [k[°]ə:t[°]əs[°]ə] (not *[k[°]ərəs[°]ə]) and [k[°]op[°]as[°]ə] (not *[k[°]owas[°]ə]) when the same suffix is added. On the contrary, a liquid never fails to vocalise to [r] when it is in intervocalic position, regardless of vowel length. For instance, the two stems /malv[°]/ 'to roll' and /ma:lv[°]/ 'to stop', which differ in vowel length, are both realised as [r] (as in [maras[°]ə]). Apart from

³³See Rhee (in preparation) for the process of consonantal lenition and vowel shortening.

liquids then, Korean never allows consonantal lenition after a short vowel.³⁴ It is not plausible to claim that the liquid is the only exception to the generalisation. Therefore, we can draw the conclusion that positing /l/ as an underlying representation is not correct.

Alternatively, let us consider /r/ as the underlying representation of these segments. First consider the process /r/ --> [l] in word-final position. In Korean, non-nasal consonants in domain-final position must undergo neutralisation³⁵, and it appears that they must contain only two elements (the head element and ?°). If a segment which contains more than two elements including ?° appears in this position, it loses elements that are neither the head nor ?° (e.g. /p^h/ (= U^o + ?° + h^o + H⁻) --> [p^o] (= U^o + ?°), and if a segment does not contain the element ?° , it acquires this element (e.g. /s^o/ (= R^o + h^o) --> [t^o] (= R^o + ?°). The segment [r] thus cannot appear by itself in such a position, because it is composed of a single element R^o. Therefore, before a word-final empty nucleus,³⁶ it is necessary to add the element ?° to the

³⁴I would like to note that it is not the case that all consonants preceded by a long vowel undergo vocalisation. There is no vocalisation of nasals, velar obstruents or affricates whether or not the preceding vowel is long. See Rhee (in preparation) for a detailed discussion.

³⁵Neutralisation refers to the fact that (i) the underlyingly tensed, and aspirated segments, fricatives and affricates alternate with the homorganic neutral stop in word-final and stem-final position, before certain consonant-initial suffixes, and (ii) the liquid is realised as [l] in the same contexts. Some examples are given below.

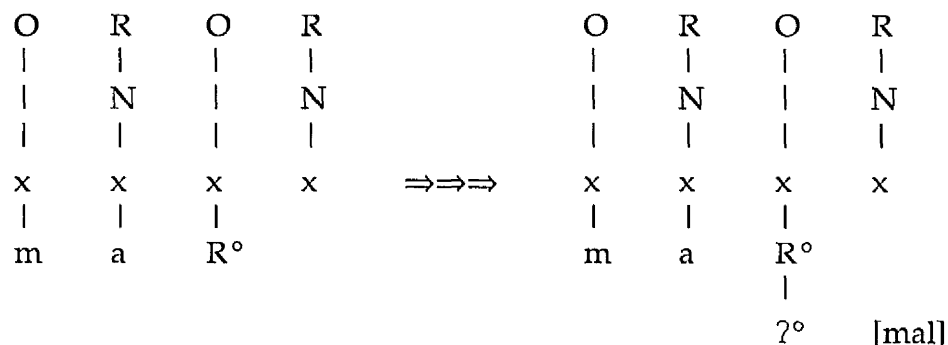
p ^o ak' + e	[p ^o ak'e]	p ^o ak'ø	[p ^o ak ^o]	'outside'
		p ^o ak'-t ^o o	[p ^o ak ^o t ^o o]	'outside and'
p ^o ath + e	[p ^o ath ^h e]	p ^o ath ^h ø	[p ^o at ^o]	'field'
		p ^o ath-t ^o o	[p ^o at ^o t ^o o]	'field and'
p ^o is ^o + i	[p ^o is ^o i]	p ^o is ^o ø	[p ^o it ^o]	'a comb'
		p ^o is ^o -t ^o o	[p ^o it ^o t ^o o]	'a comb and'
nac ^o + i	[nac ^o i]	nac ^o ø	[nat ^o]	'daytime'
		nac ^o -t ^o o	[nat ^o t ^o o]	'daytime and'
mar + i	[mari]	marø	[mal]	'horse'
		mal-t ^o o	[malt ^o o]	'horse and'

See Chapter 3 for a detailed discussion.

³⁶Recall that an apparent word-final consonant associates with an onset that is followed by the word-final empty nucleus.

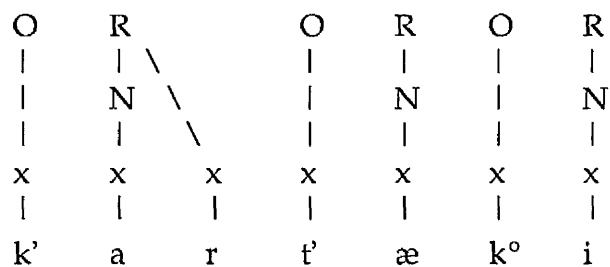
existing element R° . This combination yields [l], as we require. This is shown below in (37), where /marv $^\circ$ / 'horse' is taken as an example.

(37) word-final /r/



Let us now consider the alternation /r/ \rightarrow [l] before another consonant. According to the Coda Licensing Principle, a consonant may occupy the rhymal position iff it is governed by a following onset that dominates a consonant which is superior in charm and/or complexity to the governee. If we apply this principle to the claim that /r/ is an underlying representation, we get the following structure in (38) for the word /k'art'æk $^\circ$ i/ [k'alt'æk $^\circ$ i] 'funnel'.

(38) /k'art'æk $^\circ$ i/ 'a funnel'.



In this structure, a rhymal position dominates /r/, but this word is pronounced as [k'alt'æk $^\circ$ i]. Theoretically, there is no particular motivation for the process by which /r/ alternates with [l]. /r/ is one of the best governees, and thus is easily governed by a following

negatively charmed consonant. It would be completely ad hoc to propose a structure in which the governee undergoes a strengthening process.³⁷ We thus claim that the structure which allows a branching rhyme is incorrect.

Let us now suppose that the two consonants [lt'] in [k'alt'æk°i] is not a genuine sequence, as in (39) below. That is, the two consonants are separated by an empty nucleus, which is not phonetically pronounced for some reason.³⁸

(39) /k'arv°t'æk°i/ [k'alt'æk°i] 'a funnel'

O	N	O	N	O	N	O	N
x	x	x	x	x	x	x	x
k'	a	r		t'	æ	k°	i

What we need to recall in this situation is that the segment in question is realised as [l] before word-final empty nuclei, which are not phonetically interpreted. We can generalise the motivation of the [r] ~ [l] alternation of Korean, such that /r/ is an underlying representation realised as [l] before a licensed empty nucleus (i.e. the nucleus that is not phonetically pronounced), whether word-final or word-internal. Concretely, since the onset dominating /r/ is followed by a licensed empty nucleus, we can expect the same process that is observed before a (licensed) word-final empty nucleus. Recall that word-final /r/ (= R°) becomes [l] by composition with ?°. The same logic would explain the process /r/ --> [l] in word-internal position. If Korean allows branching rhymes, there is no reason for /r/ to be pronounced as [l].

³⁷This is discussed in more detail in Chapter 4.

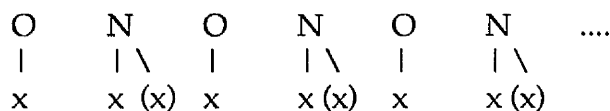
³⁸The behaviour of the empty nucleus will be discussed throughout the remaining chapters.

It is now possible to generate the alternation of [l] and [r] in Korean: [l] appears before a licensed empty nucleus; /r/ remains as it is if the following nucleus is filled with a vowel. Indeed, there are no cases in which the liquid is realised as [l] and the following nucleus has phonetic content.

What is important to the present discussion is that /r/ is always associated with an onset and is followed by a (filled or empty) nucleus. Superficially, it may seem that the sequence of [l] and another consonant preceded by a short vowel is a case of interconstituent government formed between the post-nuclear position and the following onset, but this is not the case. In fact the two segments are associated with two onsets separated by an empty nucleus.

We can reasonably extend the above discussion to all apparent consonant clusters. Recall that it is only the vowel [i] that does not appear between the sequence of consonants where other vocalic segments are audible (cf. Chapter 1). If we assume that [i] is the phonetic manifestation of the unlicensed empty nucleus, we can draw the conclusion that an apparent consonant cluster of Korean is in fact separated by a (licensed) empty nucleus. This means that Korean has only open syllables, as illustrated in (40) below.

(40) syllable structure of Korean



The established syllable structure of Korean based on GP eliminates two related problems. Firstly, we can preclude the disagreement about the level at which the syllable structure of Korean should be built.

Since this question arises from the so-called surface coda constraint, we can also dismiss such constraint. That is, the surface coda constraint is a matter of (the licensing property of) the empty nucleus which is preceded by an apparent consonant cluster, rather than being consequential of the fact that Korean allows only a single slot in the coda position. Notice that the latter explanation should allow resyllabification in order to derive a phonetic representation from an underlying representation. We can claim that phonology is the interpretation of syllable structure, rather than the reformulation of syllable structure.

In this chapter, we have discussed syllable structure in general and specifically that of Korean. Syllable structure is established at the level of lexical representation, and remains constant throughout a phonological derivation. All constituents are maximally binary, and the presence of a branching configuration is determined by the charm relationship between two adjacent segments. As far as Korean syllable structure is concerned, it contains only open syllables. An apparent consonant cluster is in fact separated by an intervening empty nucleus.

Empty nuclei can occur in both word-final and word-internal positions. They play a very significant role in various phonological phenomena in many languages. In the following chapters I discuss the empty nucleus in Korean.

Chapter Three

THE LICENSING OF EMPTY NUCLEI IN KOREAN

3.1 Introduction

This chapter discusses the licensing of empty nuclei in Korean. Firstly, we consider word-final empty nuclei (or more precisely domain-final empty nuclei). As mentioned in Chapter Two, GP claims that a phonological domain must end in a nucleus. This follows from the coda licensing principle, which states that a rhymal position must be licensed by a following onset. In accordance with this principle, an apparent domain-final consonant cannot be syllabified into a rhyme, but must be syllabified into an onset followed by a domain-final empty nucleus.

Secondly, I discuss domain-internal empty nuclei. It was proposed in Chapter Two that Korean contains only open syllables, so that any observed consonantal sequence is not genuine. In any apparent cluster of two consonants, there will be an intervening 'empty nucleus', i.e. a nucleus dominating a skeletal point which has no phonological content. We have also seen in Chapter One that [i] alternates with zero, and that its distribution is predictable. It is now possible to assume that the vowel [i] is a manifestation of an empty nucleus. We must now define the conditions under which empty nuclei are or are not expressed phonetically.

GP provides a principled account for the process of vowel-zero alternation. As can be seen in the definition of the Empty Category Principle (henceforth ECP) below, whether or not an empty nucleus is phonetically interpreted is a matter of licensing. An empty nucleus that is licensed is not phonetically interpreted, whereas an unlicensed empty nucleus is phonetically interpreted.

- (1) a. Empty Category Principle (Kaye 1990b: 314)
 - i. A licensed empty nucleus has no phonetic realisation
 - ii. An empty nucleus is licensed if (a) it is properly governed or (b) if it is domain final in languages which licenses domain-final empty nuclei
- b. Government (Charette 1991a: 83)

A nucleus α is in a governing relation with a nucleus β iff

 - (i) α and β are adjacent at the relevant level of projection
 - (ii) the relation is directional (from right-to-left or left-to-right)
- c. Proper Government (Charette 1990a: 238)

A nucleus α properly governs an empty nucleus β iff

 - (i) α governs β
 - (ii) α is not itself licensed

3.2 Domain-final empty nuclei in Korean

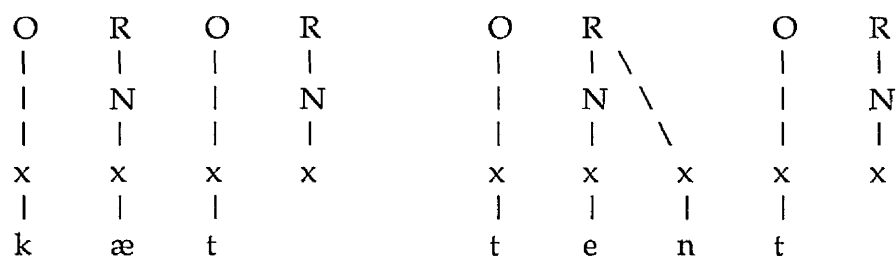
3.2.1 Korean licenses domain-final empty nuclei

As mentioned above, an apparent domain-final consonant is followed by a domain-final empty nucleus. According to ECP, domain-final empty nuclei of certain languages are licensed. This means that languages may vary according to whether or not they license domain-final empty nuclei. Languages like Dida, Japanese and Italian are distinguished from others like English and French. While a domain-final empty nucleus is realised as zero in the latter, this is not the case in the former, where words always end in a vowel. For instance, in Japanese, the English loan word *strike* is realised as [suturaiki] (industrial action), or [suturaiku] (baseball term), where the domain-final nuclear position is filled with a vowel. That is a result of the fact that domain-final empty nuclei are not licensed in Japanese.

On the other hand, English and French, among others, belong to the class of languages that license domain-final empty nuclei. These languages are characterised by the fact that they allow words ending phonetically in a consonant (cf. 2a) or a consonant cluster (cf. 2b), and under no condition will a domain-final empty nucleus be phonetically realised.

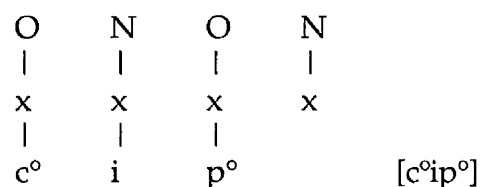
(2) a. /kætv°/ 'cat'

b. /tentv°/ 'tent'

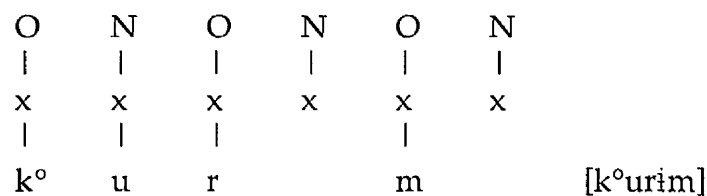


Let us now consider the case of Korean. The following two structures justify the claim that Korean licenses domain-final empty nuclei.

(3) a. /c°ip°v°/ 'house'



b. /k°urv°mv°/ 'cloud'



The fact that the domain-final empty nuclei in above structures are not phonetically interpreted can be seen as proof of the claim that domain-final empty nuclei of Korean are licensed.¹ In fact, Korean abounds with words ending in a consonant, and does not have words ending in [i]. This is important to determine whether or not Korean licenses word-final empty nuclei. It should be recalled that [i] is the

¹As will be revealed later (cf. 3.2.3), the structure (3b) eliminates a putative claim that the word-final empty nucleus in (3a) is licensed by virtue of proper government that operates from left to right, rather than being itself licensed. If this were the case, it would be the domain-final empty nucleus, in (3b), rather than the penultimate nucleus that were phonetically interpreted. However, the form *[k°urmi] is impossible.

manifestation of an empty nucleus. Thus, the fact that [i] does not occur domain-finally provides very strong evidence that an empty nucleus in this position is not phonetically realised. Therefore, we can draw the conclusion that Korean licenses domain-final empty nuclei.

Although Korean licenses domain-final empty nuclei, as does English, there is a phonological process that cannot be found in English and the like. That is, the consonants that can appear before a domain-final empty nucleus are severely constrained. Neither a fricative, an affricate, nor a negatively charmed (i.e. an aspirate or a tensed) segment can appear in this position. In a word containing one of these segments in an apparent domain-final position, it alternates with a corresponding neutral stop. For instance, the word /p^oat^hv^o/ 'field' and /k^oos^ov^o/ 'place' are realised respectively as [p^oat^he] and [k^oos^oe] when the locative suffix /e/ 'at' is added, but are pronounced as [p^oat^o] and [k^oot^o] in isolation, and as [p^oat^ok'wa] 'field and' and [k^oot^ok'wa] 'place and' when certain consonant-initial suffixes follow. This process is called 'Neutralisation'. We consider this process in the following section.

3.2.2 Neutralisation before a domain-final empty nucleus

There has been a great deal of dispute among Korean phonologists and phoneticians over the problem of neutralisation, that is, over the question of why neutralisation of tensed, aspirated, affricated and fricative consonants would occur domain-finally and before another consonant (in GP terms, before licensed empty nuclei), whereas all

distinctions are maintained when an unlicensed nucleus follows. Let us first give some examples.

(4) Neutralisation before a domain-final empty nucleus²

UR	Cv°	CV
k°	[c°uk°] 'porridge'	[c°uk°i] 'porridge (nom.)'
k'	[pak°] 'outside'	[pak'e] 'at the outside'
k ^h	[puək°] 'kitchen'	[puək ^h e] 'at a kitchen'
p°	[c°ip°] 'house'	[c°ip°i] 'house (nom.)'
p'	-	[ap'a] 'daddy'
p ^h	[ip°] 'leaf'	[ip ^h i] 'leaf (nom.)'
t°	[nat°] 'rick'	[t°al] 'the moon'
t'	-	[t'al] 'daughter'
t ^h	[p°at°] 'field'	[p°at ^h e] 'at the field'
c°	[nat°] 'daytime'	[nac°e] 'at daytime'
c'	-	[kac'a] 'imitation'
c ^h	[k'ot°] 'flower'	[k'oc ^h i] 'flower (nom.)'
s°	[ot°] 'clothes'	[os°i] 'clothes (nom.)'
s'	[it°-k'o] 'to be and'	[is'ini] 'to be + because'
m	[nam] 'other person'	[mal] 'horse'
n	[s°an] 'mountain'	[nun] 'eye'
ŋ	[k°aŋ] 'river'	[c°oŋi] 'paper'
r	[to:l] 'stone'	[noræ] 'song'

As this table shows, only seven neutral sounds appear in domain-final position: [k°, p°, t°, ŋ, m, n, l]. Apart from nasals, liquids and neutral stops, all other sounds, including fricatives and affricates, are neutralised to the homorganic neutral stop when they appear in final position. The alternation of /r/ with [l] is another case of neutralisation. This is summarised as follows:

²We note that there is no noun which ends underlyingly with /h/, thus its surface form in isolation cannot be tested. In verbal conjugation, /h/ itself may not be audible. It can be deleted before an unlicensed nucleus (e.g. /noh + A/ 'to put + adverbial suf.' --> [no(h)a]), and it is deleted from its position and is combined with the following neutral obstruent of the suffix (e.g. noh + ko [nok^ho]). Thus, /h/ is excluded from the discussion of neutralisation. For a detailed discussion on aspiration, see Rhee (in preparation).

(5) Neutralization

UR	k ^o , k', k ^h	p ^o , p', p ^h	t ^o , t', t ^h	c ^o , c', c ^h	s ^o , s'	r
PR	k ^o	p ^o	t ^o	t ^o	t ^o	l

Before we discuss this process in terms of GP, let us first review some previous analyses.

3.2.2.1 A review of Previous Analyses

Many contributions have been made towards an analysis of neutralisation (for instance, C.-W. Kim 1970, 1979, Kim-Renaud 1986, Ahn 1985, Sohn 1987, Rhee 1991 & (in preparation) etc.). They group themselves into two approaches: a phonetically-based approach, and a phonologically-based approach. I present each in turn.

A typical phonetic explanation for the neutralisation of stops (cf. the first three columns in (5)) is as follows:

The neutralisation of the three stop series in syllable-final position in Korean can be explained as follows. In syllable-final position, stops are unreleased As the articulation stops at the time of closure, allowing no more muscle tension buildup or glottal opening, the distinctive features necessary for differentiating among the three series do not exist any more, and they are pronounced and perceived as the same. (Kim-Renaud 1986: 9)

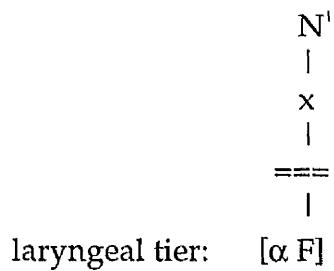
The explanation for the processes of affricates (e.g. /c^o/ --> [t^o]) and fricatives (e.g. /s^o/ --> [t^o]) is based on the same phonetic grounds, i.e. as an unreleasing process. According to Kim-Renaud (1986), Korean

affricates involve a coronal stop followed by a fricative release that is [+delayed release], and when they are unreleased, only the stop part gets articulated and perceived. As for a fricative, Kim-Renaud claims that it is like a stop except that the air escapes through a narrow opening, and when the tongue closes the oral cavity in terminating the fricative, the end result is a stop of the same point of articulation.

All other explanations except Sohn (1987) and Rhee (1991 & in preparation) are more or less the same as this. The above account appears at first sight adequate. However, following the above claim, we predict that if a language has an unreleasing process (in final position), we should find the same (or similar) effect in the consonant in question. In English, however, final stops are often unreleased, but there is no process such as /s/ --> [t]. Thus, what we need is a phonological account which can explain the difference between the two languages. Concretely, what is the phonological definition of 'unreleasing', and of some other articulatory activities, such as 'no muscle tension buildup or glottal opening', and the 'loss of [delayed release]'?

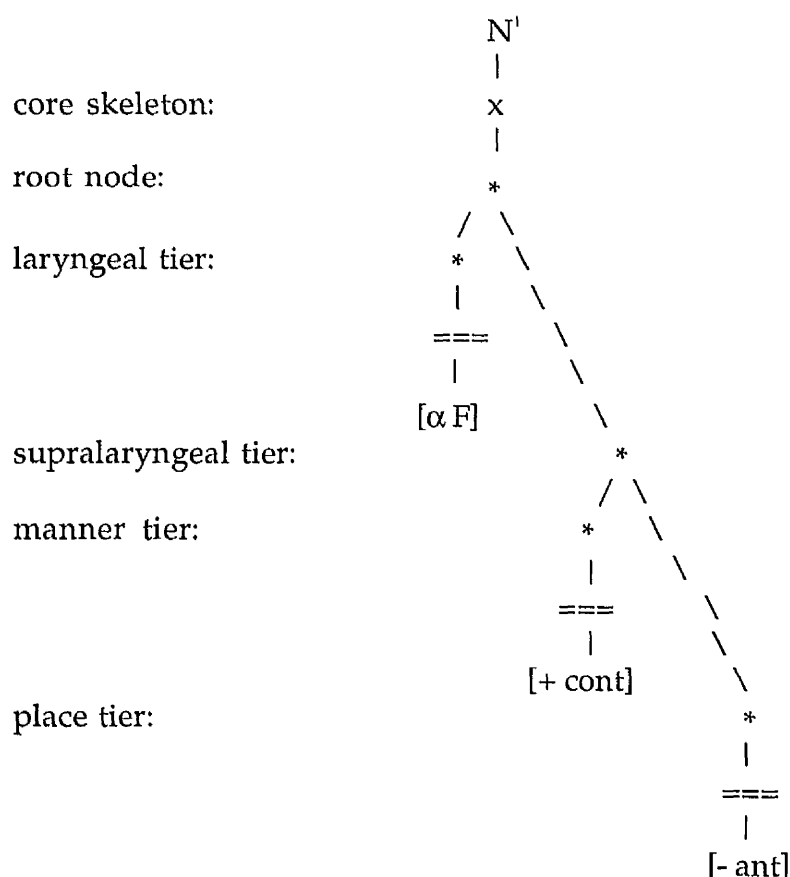
An alternative account for neutralisation can be found in Sohn (1987), who discusses it within the framework of underspecification and feature geometry. Sohn claims that the above three types of stop differ in laryngeal features. That is, tensed consonants have the feature [+spread glottis], aspirated consonants have [+constricted glottis], while neutral consonants have neither gesture (i.e. are claimed to be underspecified). Therefore, Sohn claims that neutralization in Korean is firstly characterised by the deletion of the laryngeal features, as shown below in (6).

(6) Neutralisation (Sohn 1986: 264)



As for the neutralisation of the affricates and fricatives, Sohn claims that /t°/ is underlyingly totally unspecified, whereas /s°/ is specified with [+cont] on the manner tier, /c°/ is specified with [-ant] on the place tier. Therefore, what is involved in the neutralisation of the affricates and fricatives into /t°/ is delinking of these underlyingly specified features for coronal consonants (1986: 265). Sohn, in conclusion, claims that neutralisation is identified as the delinking of the features on the laryngeal tier, the manner tier, and the place tier if characterised by [-anterior], and proposes the neutralisation rule as in (7).

(7) Neutralisation (Sohn 1987: 266)



The structure (7) shows that neutralisation applies when any feature specifications appear on the laryngeal tier, and when the manner and place tier dominate [+ cont] and [- ant] respectively. Sohn also claims that a neutral velar stop, which is specified as [- ant, - cor] on the place tier, is not subject to neutralisation, because neutralisation refers to the feature specification [- ant] only as a functional unit on the place tier.

Sohn's approach seems reasonable to account for neutralisation in Korean. However, her delinking approach cannot account for neutralisation of /r/, whereby it alternates with [l].³ Since /r/ contains neither a laryngeal feature, [+ cont] nor [- ant], it must not be subject to

³Sohn (1987: 314) claims that /r/ is an underlying segment, and is realised as [l] in rhymal position. Note that she has only discussed the neutralisation of obstruents.

neutralisation. Furthermore, Sohn does not show what motivates neutralisation in Korean. Since there are languages which do not have such a process, we should explain why Korean does. Moreover, without having reasonable answers for the above questions, we may lose the logical connection between neutralisation and some other closely related phonological phenomena in Korean, such as so-called consonantal assimilation (e.g. /[[k^ouk^ov^o][rjək^ov^o]]/ --> [k^ouŋnək^o] 'national power').

3.2.2.2 A GP based approach

GP, which insists on providing a purely phonological solution for all phonological phenomena, interprets neutralisation in a different way.

Let us first consider the motivation for this process. I would like to claim that there could be certain onsets which cannot be licensed by licensed empty nuclei.⁴ I claim that neutralisation is due to this property of the licensed nucleus of Korean.

There are two different types of restriction of an onset that appears before a licensed empty nucleus. One is a restriction on the structure of the preceding onset constituent. For instance as mentioned in Chapter 2, in English, lexically unlicensed (i.e. filled) nuclei allow nearly all types of onsets to precede them, whereas the final empty nuclei of this

⁴Harris & Kaye (1990) and Harris (1990) have a similar suggestion: "If nuclei in a particular system display differences with respect to their ability to license segmental material in a preceding onset, then a governed nucleus will always possess less licensing capacity than a governing nucleus (Harris 1990: 284)."

language cannot license a preceding branching onset. Notice that English does not allow words ending in /-pr, -tr, -kr/ (cf. *[patr]).⁵

The other restriction is on the segmental content of the preceding onset. Some segments may appear before a licensed empty nucleus, others may not. In other words, a licensed empty nucleus may not license certain segments to appear in the preceding onset. Such consonants can only be licensed by an unlicensed nucleus. In Korean, it appears that these are fricatives, affricates, and negatively charmed segments. It is for this reason that they alternate with other segments which can be licensed by a domain-final empty nucleus.⁶ In order to see how 'neutralisation' is formulated in terms of GP, we need to consider the segmental representation of consonants of Korean.

3.2.2.2.1 Lexical representations of consonants

It is claimed in GP that phonological segments are composed of elements. Segments can differ in their value for a property known as 'charm'. Whether or not a segment is charmed (positive or negative) is determined by the elements it contains. Negatively charmed segments contain a negative element, and positively charmed segments contain a positive element. All phonological elements which are relevant to consonantal representations are repeated below in (8).

⁵ In French, on the other hand, word-final empty nuclei allow any type of structure in the preceding onset position. See Nikiema (1989b) and Charette (1991) for the difference in the licensing properties of the empty nucleus between the two languages. See also Chapter 5.

⁶ If these segments appear word-internally, a properly governable word-internal empty nucleus in the following position resists licensing. See Chapter 4 for a detailed discussion.

(8)	Elements	Salient property	Elements	Salient property
	U ^o	labial	I ^o	palatal
	v ^o	none	R ^o	coronal
	ʔ ^o	occluded	h ^o	narrowed
	N ⁺	nasal	H ⁻	stiff vocal cords
	L ⁻	slack vocal cords		

Harris (1990) discusses the role of the above elements in consonantal representations. Elements I^o, U^o, R^o and v^o contribute to the place dimension of consonantal segments. The first two elements define palatality and labiality, respectively. Thus, they contribute to palatal and labial consonants. The element R^o express the property of coronality. This element is found in coronal segments, and is realised as [r] in a simplex structure. The element v^o results in velarity if it is the head of compound consonants such as [k] and [g].

In determining the manner dimension of consonants, the following elements are proposed: ʔ^o, h^o and N⁺. The salient property of the element ʔ^o is an occluded articulatory gesture. Thus, this element cannot contribute to so-called continuant consonants such as [s]. In a simplex structure, ʔ^o is manifested as a glottal stop, which is found, for example, in dialects of British English (cf. [sɪʔɪ] 'city'), while in compound structures, it contributes constriction at the place of articulation. As for the element h^o, Harris (1990) demonstrates its presence in obstruents with evidence from the spirantisation process of Liverpool English, and a debuccalisation process found in Burmese. This element contributes a noise component to the structure of an obstruent. Thus, this element is not present in unreleased obstruents. In a simplex structure it is realised as a glottal fricative, as in 'horse'.

The element N^+ contributes to nasal consonants as well as to nasalised vowels.

Finally, we consider the elements H^- and L^- . The salient properties of these elements are stiff vocal cords and slack vocal cords, respectively. The former can be found in voiceless, tensed and aspirated consonants, the latter in 'voiced' consonants.⁷ These elements do not appear in the representation of neutral segments.

Based on the above elements, Rhee (in preparation) proposes the following representations of Korean consonants.⁸

(9) neutrally charmed segments

p°	t°	k°	c°	s°	m	n	η	r	h
x	x	x	x	x	x	x	x	x	x
γ°	γ°	γ°	γ°	h°	γ°	γ°	γ°		<u>h°</u>
<u>U°</u>	<u>R°</u>	<u>v°</u>	<u>R°</u>	<u>R°</u>	<u>U°</u>	<u>R°</u>	<u>v°</u>	<u>R°</u>	
|	|	|	I°						
|	|	|	|		N^+	N^+	N^+		
h°	h°	h°	h°						
					L^-	L^-	L^-		

⁷In Korean, a neutral obstruent after a nasal or a vowel is pronounced as its voiced counterpart. However, I would like to claim that these two cases are different in terms of L^- . That is, nasals contain the element L^- in their underlying representations, thus a following neutral obstruent has a source from which to obtain this element. However, vowels do not have L^- in their underlying representations, thus a neutral obstruent has no way of obtaining this element. I therefore transcribe the voiced counterpart of the neutral obstruent only when it follows a nasal.

⁸We note that the underlined element of each representation is the head of the structure.

negatively charmed segments

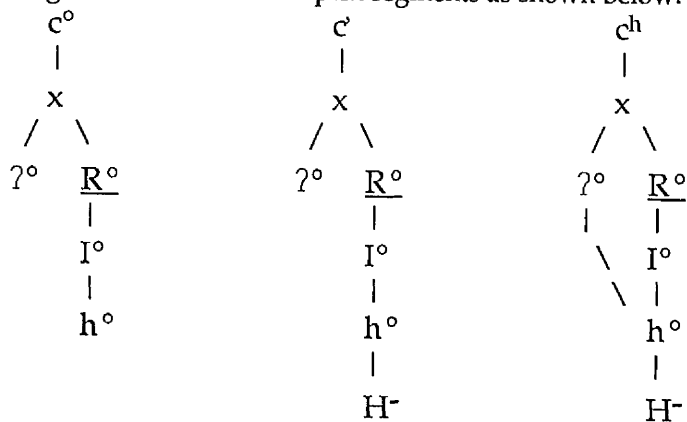
a. tensed segments

p'	t'	k'	c'	s'
x	x	x	x	x
ʔ°	ʔ°	ʔ°	ʔ°	|
<u>U°</u>	<u>R°</u>	<u>v°</u>	<u>R°</u>	<u>R°</u>
|	|	|	I°	|
h°	h°	h°	h°	h°
H-	H-	H-	H-	H-

b. aspirated segments

p ^h	t ^h	k ^h	c ^{h9}
x	x	x	x
\	\	\	\
ʔ° \	ʔ° \	ʔ° \	ʔ° \
/	/	/	/
h°	h°	h°	h°
<u>U°</u>	<u>R°</u>	<u>v°</u>	<u>R°</u>
|	|	|	I°
H-	H-	H-	H-

⁹In fact, Rhee regards affricates as complex segments as shown below:

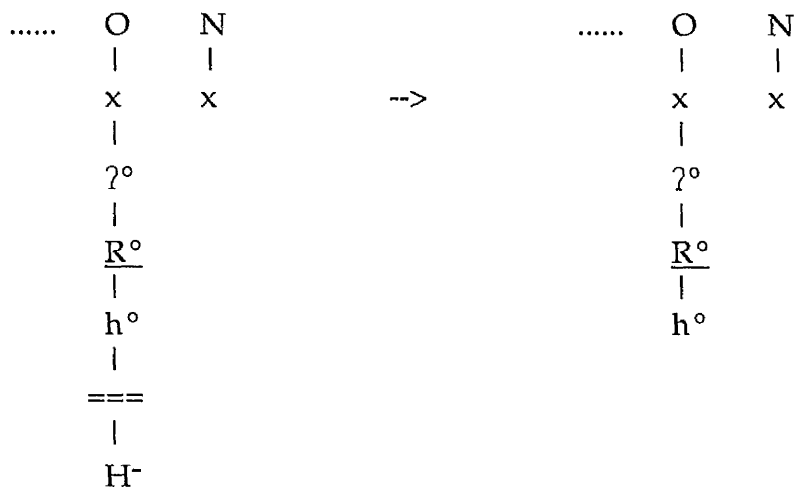


With the representations above in mind, let us consider neutralisation in Korean in the following sections.¹⁰ In the first section, I will consider the neutralisation of stops and affricates. In the following section, I will discuss the case of fricatives and the liquid.

3.2.2.2 The neutralisation of stops and affricates

Let us first consider the case of stops. Since negatively charmed stops (i.e. p^h , p' , t^h , t' , k^h , k') alternate with their corresponding neutral counterpart before a domain-final empty nucleus, it can be said that the element H^- , which is present in tensed and aspirated segments, will be delinked (or uninterpreted) in this position. What this means is that domain-final empty nuclei in Korean cannot not license negatively charmed elements. Thus, unlicensed elements are not interpreted as part of the realisation of the segment.

(10) $/t'/ \rightarrow [t^\circ]$



¹⁰I would like to note that, in the explanation of neutralisation below, I adopt some of Rhee's (1991 & in preparation) account of neutralisation.

Our task in accounting for the neutralisation of the negative stops is not finished yet. That is, we need to explain the so-called 'unreleasing' process. We need to define this notion within a phonological framework. As for this process, Harris (1990) claims that the contrast between the released and unreleased phase of obstruents is characterised by the presence or absence of the element h° , the salient property of which is a narrowed articulatory stricture that produces turbulent airflow, and which is responsible for the presence of high-frequency aperiodic energy in the speech signal. Therefore, the notion of 'unreleasing' can be defined along the parameter that word-final empty nuclei of Korean do not license the element h° .

We are now able to formulate the neutralisation of stops as in (11) below. That is, the unlicensed elements, H^{-} and h° , are uninterpreted before a licensed empty nucleus.

(11) stops before domain-final empty nuclei

a.	p'	->	p°	b.	p^h	->	p°
	x		x		x		x
					\		
	γ°		γ°		$\gamma^{\circ} \backslash$		γ°
					/		
	h°		<u>U°</u>		h°		<u>U°</u>
	<u>U°</u>				<u>U°</u>		
	H^{-}				H^{-}		

c.	t'	->	t°	d.	t ^h	->	t°
	x		x		x		x
					\		
	ʔ°		ʔ°		ʔ° \		ʔ°
					/		
	h°		<u>R°</u>		h°		<u>R°</u>
	<u>R°</u>				<u>R°</u>		
	H-				H-		
e.	k'	->	k°	f.	k ^h	->	k° ¹¹
	x		x		x		x
					\		
	ʔ°		ʔ°		ʔ° \		ʔ°
					/		
	h°		<u>v°</u>		h°		<u>v°</u>
	<u>v°</u>				<u>v°</u>		
	H-				H-		

Based upon the above processes, the neutralisation of stops can be expressed as 'lenition' (or 'decomposition') through the loss of unlicensed elements. The remaining elements define the phonetic interpretation. Since ʔ° indicates constriction at the place of articulation, defined by one of the other constituent elements in the

¹¹Since one characteristic of the process of neutralisation is defined as h° deletion, it may possibly apply to neutral stops, as seen below. In order to differentiate the neutralised stops from the underlying ones, one may use the symbol C[°] rather than C°.

p°	->	p°	t°	->	t°	k°	->	k°
x		x	x		x	x		x
ʔ°		ʔ°	ʔ°		ʔ°	ʔ°		ʔ°
h°		<u>U°</u>	h°		<u>R°</u>	h°		<u>v°</u>
<u>U°</u>			<u>R°</u>			<u>v°</u>		

compound structure, it produces [p°] when fused with U°, [t°] when fused with R°, and [k°] when fused with v°.

Secondly, let us consider the case of affricates. The affricate /c°/ is composed of R°, I°, and the noise element h°. Adding some additional tonal elements to this representation derives two negatively charmed segments, /c' / and /c^h/. These affricates undergo neutralisation before domain-final empty nuclei, and become [t°]. This is illustrated by the structures below in (12).

(12) affricates before domain-final empty nuclei

a.	c°	->	t°	b.	c'	->	t°	c.	c ^h	->	t°
	x		x		x		x		x		x
									\		
	ɔ°		ɔ°		ɔ°		ɔ°		ɔ° \		ɔ°
									/		
	h°		<u>R°</u>		h°		<u>R°</u>		h°		<u>R°</u>
	<u>R°</u>				<u>R°</u>				<u>R°</u>		
	I°				I°				I°		
					H-				H-		

As in the case of stops, the elements H- and h° cannot be licensed by the following domain-final empty nucleus, thus they will not be interpreted in this position. From the above derivations, we can also see that the element I° cannot be licensed before a licensed empty nucleus.

3.2.2.2.3 The neutralisation of fricatives and the liquid

Let us now consider the neutralisation of fricatives and the liquid. The alveolar fricative /s^o/ is composed of two elements, R^o and h^o, and adding the negative element H⁻ to these elements produces tensed /s'/.¹² On the other hand, the liquid /r/ is composed of a single element R^o. As mentioned above, fricatives are realised as [t^o], and /r/ is realised as [l] before a domain-final empty nucleus.

(13) fricatives and /r/ before domain-final empty nuclei

a.	s ^o	->	t ^o	b.	s'	->	t ^o
	x		x		x		x
	<u>R</u> ^o		? ^o		<u>R</u> ^o		? ^o
	h ^o		<u>R</u> ^o		h ^o		<u>R</u> ^o
					H ⁻		
c.	r	->	l				
	x		x				
	R ^o		R ^o				
			<u>?^o</u>				

In case of the fricatives, as expected, h^o and H⁻ are not interpreted before a domain-final empty nucleus. What is important is that the element ?^o is added in order for /s^o/ to be realised as [t^o]. The same is true in the case of /r/. Notice that [l] is composed of R^o and ?^o. As for this, Rhee (in preparation) claims that the domain-final empty nuclei of Korean can license only neutral consonants which have the element

¹²Note that there is no /s^h/ in Korean.

ʔ°. Therefore, a change in the make-up of the segments /s°/, /s'°/ and /r/ is required to meet this condition. The domain-final empty nucleus licenses an ambient ʔ° element, resulting in the segments [t°] and [l] respectively.

The above discussion of fricatives and the liquid /r/ shows that neutralisation, in the sense of 'unreleasing', is not the simple stripping away of the element h°, but is defined as reinforcement by the element ʔ° in certain cases. Thus, Sohn's (1987) delinking analysis does not adequately explain the process of neutralisation.

There is one thing we may add to the above discussion. It appears that non-nasal consonants before the domain-final empty nuclei of Korean must have only two elements;¹³ one, the element that contributes to the place dimension, and the other, ʔ°, as the manner specification of the segment. If segments contain more than one element of the place dimension, the head will remain, as in the case of affricates. If segments do not contain ʔ°, this element must be added, as in fricatives and /r/.

We have so far discussed neutralisation in Korean in terms of GP. What is revealed is that domain-final empty nuclei in Korean have restricted licensing ability for the preceding onset, and this restriction is in the fact that certain elements are not licensed by a domain-final empty nucleus.

Let us now move on to the licensing of word-internal empty nuclei in Korean.

¹³I should note that this idea comes from a personal communication with S. Yoshida.

3.3 Domain-internal empty nuclei and proper government

3.3.1 The licensing of domain-internal empty nuclei

In order for the discussion given below to be clearer, we need to arm ourselves with the following basic principles.

GP provides a principled account for the process of vowel-zero alternation in domain-internal position. It claims that the alternation does not result from the insertion or the deletion of a nucleus, but, rather, the nuclear position is seen as being always present in syllable structure. For instance, in a rule-based system, the process of [ɪ]-zero alternation in Moroccan Arabic (e.g. *akɪl* '(he) eats' vs. *akølu* '(they) eat') is expressed either by saying that the nucleus which dominates [ɪ] is deleted when the position precedes the sequence of a single consonant followed by a vowel, or alternatively, that the nucleus is inserted when the position is followed by a single consonant before a word boundary or by two consonants. However, GP claims that this is not the case. What GP claims is that the nucleus involved vowel-zero alternation is always present. Furthermore, the nucleus is lexically empty, and it may or may not be phonetically interpreted, according to the general principles of phonological theory.

Kaye (1987, 1990b) and Charette (1988, 1990a, 1991a) propose proper government as a principle conditioning vowel-zero alternations in domain-internal positions. Proper government, as repeated below, is a condition on the licensing of domain-internal empty nuclei.

(14) a. Government (Charette 1991a: 83)

A nucleus α is in a governing relation with a nucleus β iff

- (i) α and β are adjacent at this level of projection
- (ii) the relation is directional (from right-to-left or left-to-right)

b. Proper Government (Charette 1990a: 238)¹⁴

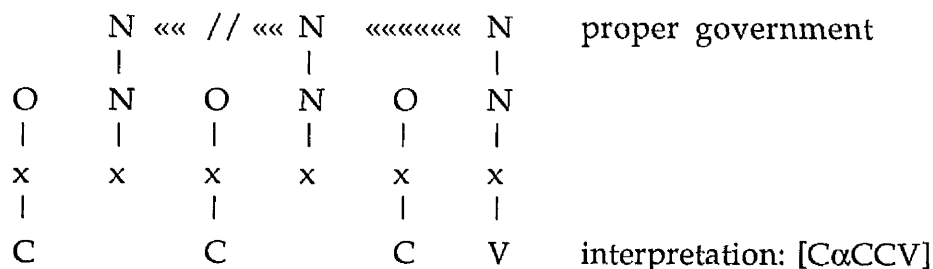
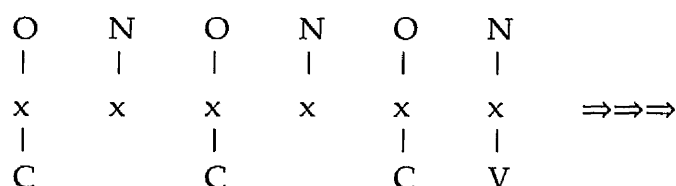
A nucleus α properly governs an empty nucleus β iff

- (i) α governs β
- (ii) α is not itself licensed

For a domain-internal empty nucleus to be licensed, it must be properly governed. In other words, a domain-internal nucleus that is realised as zero is an instance of an empty nucleus that is properly governed. On the other hand, a domain-internal empty nucleus which is not properly governed is not licensed. Unlicensed domain-internal empty nuclei must be phonetically realised. We illustrate this in (15) below, where we assume that proper government operates from right to left.

¹⁴In Kaye (1987, 1990b), it is claimed that proper government applies at the level of the nuclear projection. This view is modified by Charette (1990b, 1991a) with the claim that proper government applies only at the level of the licenser projection. The difference between the two levels is that only nuclei are visible at the nuclear projection, whereas on the licenser projection, we find all nuclei (whether they are filled or not) as well as onset heads. Readers are referred to Charette for a detailed discussion. Acknowledge that I now say that proper government applies at the nuclear projection, because, at the time of writing this thesis, Charette (to appear) adds the following notion in her definition of proper government: (iii) α is not a government-licenser. However, I would like to keep the notion of licenser projection, since either condition poses no theoretical problem, and derives the same result. The advantage of Charette's new proposal is that both the licensing process of filled nuclei and the proper government of empty nuclei can be accounted for at the same projection.

(15) proper government and interpretation of empty nuclei



The above structure contains two domain-internal empty nuclei. They will be phonetically interpreted unless licensed through proper government. The empty nucleus in the penultimate nuclear position is properly governed by the following nucleus that is lexically filled. Thus, it is licensed, and will not be phonetically interpreted. The initial empty nucleus, however, cannot be properly governed by the following nucleus, because the potential proper governor is itself licensed. This licensed empty nucleus cannot be a proper governor as per (14bii). The initial empty nucleus is thus phonetically manifested. We derive the form [CαCCV].

3.3.2 Zero realisation before a single consonant

Following the conditions of Proper Government, let us consider the Korean [i]-zero alternation in domain-internal position. Following the

claim that the vowel [i] is an instance of an empty nucleus, the contexts of alternation can be characterised as below in (16):¹⁵

- (16) a. An empty nucleus is realised as zero when the following nucleus, which is preceded by a single consonant, is unlicensed.
- b. An empty nucleus is realised as [i] before a word-final consonant.
- c. An empty nucleus is realised as [i] before an apparent consonant cluster.

We start our discussion with the context (16a), and the corresponding examples are given in (17).

- (17) a. an empty nucleus in penultimate position

/s°æ:k°v°s'i/	[s°æ:k°s'i]	'girl'
/ə:m°v°p°h°o/	[ə:mp°h°o]	'threat'
/mi:r°v°c°h°i/	[mi:l°c°h°i]	'stick'
/k°a:m°v°c°h°i/	[k°a:m°c°h°i]	'to sew'
/nak°v°c°i/	[nak°c°i]	'octopus'
/p°ənv°k°æ/	[p°əngæ]	'lightning'
/s°ənv°p°i/	[s°ənb°i]	'scholar'
/t°oŋv°mu/	[t°oŋmu]	'friend'
/s°aŋv°c°h°i/	[s°aŋc°h°i]	'cabbage'
/i:m°v°c°a/	[i:m°ɔ̃a]	'owner'
/k°a:r°v°mi/	[k°a:l°mi]	'sea cucumber'
/ma:r°v°k°i/	[ma:l°k°i]	'waistband'
/t°a:r°v°k°i/	[t°a:l°k°i]	'strawberry'
/t°ərv°mi/	[t°əl°mi]	'the nape'

¹⁵The discussion of syllable structure in Chapter 2 requires that some of the contexts in (16) be revised. For clarity we leave this aside for the present.

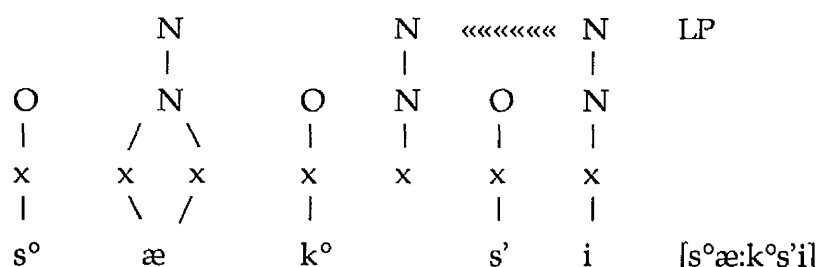
b. an empty nucleus in antepenultimate position

/k'ak°v°t'uk°i/	[k'ak°t'uk°i]	'pickles'
/s°o:k°v°k'os°v°/	[s°o:k°k'ot°]	'petticoat'
/p°əp°v°s'ək°v°/	[p°əp°s'ək°]	'noise'
/k°ək°v°c'əŋv°/	[k°ək°c'əŋ]	'anxiety'
/p°æk°v°c'aŋv°/	[p°æk°c'aŋ]	'butcher'
/s°ip°v°s'aŋv°/	[s°ip°s'aŋ]	'just right'
/t°anv°k°orv°/	[t°angol]	'customer'
/t°anv°p°ak°v°/	[t°anbak°]	'now'
/namv°c°is°v°/	[namɕit°]	'over'
/k°o:mv°p°həŋv°/	[k°o:mp°həŋ]	'must'
/ə:ŋv°t°əŋi/	[ə:ŋdəŋi]	'the bottom'
/s°o:ŋv°k°os°v°/	[s°o:ŋgot°]	'screw'
/ma:rv°s'əŋv°/	[ma:ls'əŋ]	'trouble'
/k°u:rv°t'uk°v°/	[k°u:lt'uk°]	'chimney'
/t°o:rv°c'ək°wi/	[t°o:lc'ək°wi]	'hinge'
/p°urv°s'uk°v°/	[p°uls'uk°]	'suddenly'

In the words presented in (17a), the penultimate empty nuclei are not phonetically realised. In those words, the empty nucleus is directly followed by a final nucleus that is lexically filled, thus, unlicensed.¹⁶ This unlicensed nucleus properly governs the preceding empty nucleus. Consequently, the empty nucleus is licensed, and will not be phonetically manifested. I attribute to words like /s°æ:k°v°s'i/ [s°æ:k°s'i] 'girl' the structure in (18) below, where nuclei are projected at the level of licenser projection (henceforth, LP). Since Korean does not allow genuine consonant clusters, only nuclei are visible at the level of LP.

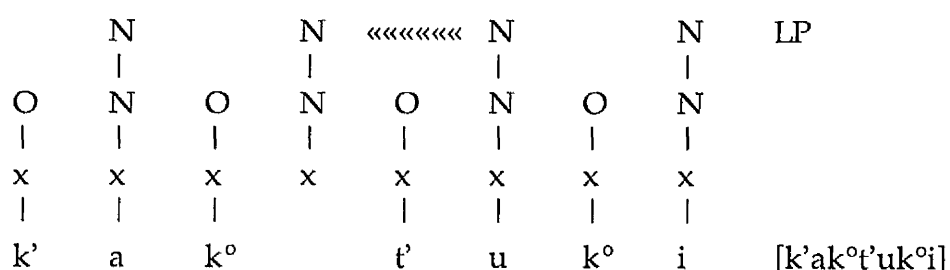
¹⁶The fact that the directionality of proper government in Korean is from right to left will be justified shortly.

(18) a. /s°æ:k°v°s'i/ [s°æ:k°s'i] 'girl'



Let us now consider (17b), where a word-internal nucleus acts as a proper governor. We take the word /k'ak°v°t'uk°i/ [k'ak°t'uk°i] 'pickles' as an example:

(19) /k'ak°v°t'uk°i/ [k'ak°t'uk°i] 'pickles'



As can be seen in the above structure, the word /k'ak°v°t'uk°i/ 'pickles' contains an empty nucleus in the antepenultimate nuclear position. This empty nucleus is subject to proper government. Since this empty nucleus is adjacent to the governor at the level of LP, it will be properly governed by the following nucleus. Therefore, the empty nucleus is licensed, and will not be phonetically interpreted. We thus derive the correct result, [k'ak°t'uk°i].

We have so far considered the context where an empty nucleus is followed by a lexically filled nucleus. We have seen that the empty nucleus does not receive phonetic interpretation by virtue of proper government. In the following section, let us consider the case of (16b).

3.3.3 The [i] vowel before a domain-final consonant

The second context to consider in the [i]-zero alternation of Korean is that the [i] vowel cannot be absent before a domain-final consonant.

Following the definition of Government (cf. 14a) and Proper government (cf. 14b), there are two cases where proper government fails to apply. Firstly, it cannot apply if the nucleus which is the potential governor is licensed, as per (14bii). Secondly, proper government fails to apply if the governor and governee are not adjacent at the level in question, as per (14ai). On the level of LP, where proper government operates, all licensors (all nuclei, and the governing heads of non-nuclear constituents) are projected. If a non-nuclear head, which is always the head of the constituent onset, intervenes between two nuclei at the level of LP, proper government fails to apply. However, note that this situation does not obtain in Korean, because this language allows only open syllables, and has no branching onsets. With this in mind let us consider the words in (20).

(20) the [i] vowel must be present before a word-final consonant

/k ^o at ^o v ^o k ^o v ^o /	[k ^o at ^o ik ^o]	'full'
/k ^o jar ^o v ^o k ^o v ^o /	[k ^o jarik ^o]	'admirable'
/p ^o ər ^o v ^o s ^o v ^o /	[p ^o ərɪt ^o]	'habit'
/t ^o at ^o v ^o s ^o v ^o /	[t ^o at ^o it ^o]	'warmly'
/k ^o ət ^o v ^o p ^o v ^o /	[k ^o ət ^o ip ^o]	'again'
/mur ^o v ^o p ^h v ^o /	[murip ^o]	'knee'
/mæt ^o v ^o p ^o v ^o /	[mæt ^o ip ^o]	'knot'
/mos ^o v ^o p ^o v ^o /	[mos ^o ip ^o]	'figure'
/mik ^o v ^o nv ^o /	[mik ^o in]	'smooth'
/k ^o ur ^o v ^o mv ^o /	[k ^o urim]	'cloud'
/jər ^o v ^o mv ^o /	[jərɪm]	'summer'

/s°as°v°mv°/	[s°as°im]	'deer'
/s°i:mv°p°urv°mv°/	[s°i:mp°urim]	'errand'
/k°as°v°mv°/	[k°as°im]	'breast'
/ərv°nv°/	[ərin]	'adult'
/s°ərv°nv°/	[s°ərin]	'thirty'
/mo:t°v°nv°/	[mo:t°in]	'all'
/c°ac°v°ŋv°/	[c°ac°iŋ]	'anger'
/s°v°s°v°ŋv°/	[s°is°iŋ]	'teacher'
/t°ə:t°v°rv°/	[t°ə:t°il]	'to shout'
/it°h°v°rv°/	[it°hil]	'two days'
/s°ik°v°rv°/	[s°ik°il]	'noise'
/k°us°v°rv°/	[k°us°il]	'jewel'
/p°inv°rv°/	[p°inil]	'scale'
/k°ut°v°rv°/	[k°ut°il]	'hypocaust'
/onv°rv°/	[onil]	'today'

As mentioned above, I assume that the vowel [i] is an instance of the interpretation of an empty nucleus. Therefore, these words contain an empty nucleus in the penultimate nuclear position (i.e. before a domain-final consonant). This position is phonetically manifested by the principles of proper government, because the domain-final empty nucleus, which is the potential governor, is itself licensed. I attribute the following structure to a word like [k°at°ik°] 'full', for example:

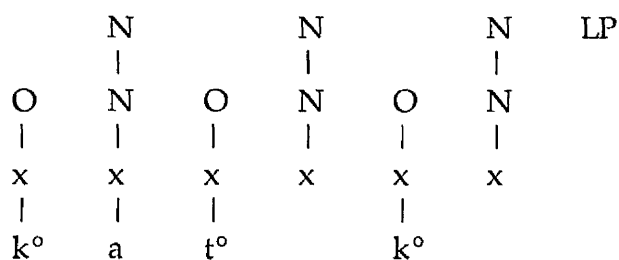
(21) /k°at°v°k°v°/ [k°at°ik°] 'full'

O	N	O	N	O	N
x	x	x	x	x	x
k°	a	t°	[i]	k°	

The above structure contains an empty nucleus in the penultimate and final positions. The difference between this structure and /s°æ:k°v°s°i/ 'girl' in (18) is that the domain-final nucleus is lexically filled in (18), while in (21), it is empty (note that vowel length has no influence on

the [i]-zero alternation). Such a difference gives us a different result in the interpretation of the penultimate nuclear position of the two structures: example (21) manifests the vowel [i], whereas (18) does not. Proper government accounts for the former phenomenon. Consider the following structure, in which higher projections are presented:

(22) /k^oat^ov^ok^ov^o/ [k^oat^oik^o] 'full'



As mentioned above, only nuclei are visible at the level of LP in Korean. The initial nucleus is filled with a segment, thus, it is not relevant to proper government. The penultimate nuclear position is a domain-internal empty nucleus, thus it must be subject to proper government. The proper governor of this nucleus is the domain-final nucleus, which is empty in this structure. As mentioned above, domain-final empty nuclei of Korean are licensed. A licensed empty nucleus is not phonetically interpreted, and cannot be a proper governor. Therefore, the domain-final empty nucleus of the above structure cannot be a proper governor. In other words, the domain-final empty nucleus cannot license the preceding empty nucleus, and an unlicensed empty nucleus must be phonetically interpreted. The penultimate nucleus is therefore phonetically interpreted. The empty nucleus is thus interpreted as [i] in this position, and the result is [k^oat^oik^o]. This is shown in (23) below.

(23) /k°at°v°k°v°/ [k°at°ik°] 'full'¹⁷

	N		N	«« // ««	N	LP
O	N	O	N	O	N	
x	x	x	x	x	x	
k°	a	t°	[i]	k°		[k°at°ik°]

Needless to say, the phonetic realisation of the penultimate nuclear position of the words in (20) can be accounted for in the same way as above. Let us now move onto the context described in (16c).

3.3.4 The [i] vowel before an apparent consonant cluster

In this section, let us consider the case where [i] is realised before an apparent consonant cluster. Since Korean does not allow genuine consonant clusters, an empty nucleus must always intervene between two consonants. Some examples are given in (24) below:

¹⁷An approach in which proper government applies from left to right fails to account for the zero realisation of the domain-final empty nuclei. If it were the case, it must be the domain-final empty nucleus rather than the penultimate nucleus that is phonetically realised, as is shown below.

	N	»»»»»»	N	»» // »»	N	LP
O	N	O	N	O	N	
x	x	x	x	x	x	
k°	a	t°		k°	[i]	*[k°at°k°i]

(24) [i] before Cv°CV

/k°at°v°rv°mak°v°/	[k°at°ilmak°]	'be arrogant'
/s°ik°h°v°nv°t°uŋv°/	[s°ik°hinduŋ]	'be impudent'
/s°ik°v°mv°ch°i/	[s°ik°imch°i]	'spinach'
/k°as°v°mv°ch°ire/	[k°as°imch°ire]	'be sleepy'
/t°as°v°rv°k°i/	[t°as°ilk°i]	'gastropods'
/k°ot°v°rv°k°æ/	[k°ot°ilk°æ]	'cowbell'

The forms given in (24) display sequences of two consecutive empty nuclei. Notice that a vowel must be present after an apparent consonant cluster. There is no word in Korean where a vowel in the nuclear position, preceded by an apparent consonant cluster, is absent (cf. *[almøk°ø] and *[p°alk°ø]). What is interesting to note in these words, is that it is the leftmost empty nucleus that is phonetically interpreted. This follows from proper government. From right to left, a filled nucleus properly governs the immediately preceding empty nucleus. Thus, the properly governed empty nucleus is not phonetically interpreted (cf. 25b). The properly governed nucleus cannot itself properly govern the empty nucleus to its left, since it is licensed and a licensed empty nucleus is not a proper governor (cf. 25c). Therefore, the leftmost empty nucleus must be phonetically interpreted. This is illustrated by the word /s°ik°v°mv°ch°i/ [s°ik°imch°i] 'spinach' in (25).

(25) /s°ik°v°mv°ch°i/ [s°ik°imch°i] 'spinach'

a.	O	N	O	N	O	N	O	N	
	x	x	x	x	x	x	x	x	⇒⇒
	s°	i	k°		m		ch	i	

Chapter Four

SOME ADDITIONAL CONDITIONS ON THE LICENSING OF WORD INTERNAL EMPTY NUCLEI

4.1 Introduction

In chapter 3, we saw that the behaviour of domain-internal empty nuclei in Korean can be explained in terms of proper government, as is the case in other languages such as Moroccan Arabic and French. However, many instances where a properly governable empty nucleus (i.e. the empty nucleus which is followed by an unlicensed nucleus) receives phonetic interpretation are manifested in Korean. In this chapter we will consider this phenomenon.

In the following section, I discuss domain-internal empty nuclei which are preceded by either a fricative, an affricate, or a negatively charmed (i.e. a tensed or aspirated) segment. In the preceding chapter, we saw that these segments are not licensed by a domain-final empty nucleus and thus alternate with some other segment. It will be seen in the discussion in the following section that a properly governable empty nucleus resists being licensed when it is preceded by one of these segments. In 4.3, we will consider words containing an empty nucleus in the first nuclear position. This is another context where empty nuclei must receive phonetic interpretation. In 4.4, I discuss the cases in which properly governable empty nuclei receive phonetic interpretation when the two onsets surrounding the empty nucleus

fail to form a governing relation. This leads me to claim that the licensing of domain-internal empty nuclei in Korean requires two conditions, namely, proper government and inter-onset government. Concretely, a properly governable empty nucleus will be licensed if it is within an inter-onset governing domain. If inter-onset government fails to apply between the two onsets that surround the empty nucleus, the intervening empty nucleus will receive phonetic interpretation even if it is properly governable by the following unlicensed nucleus. On the other hand, a domain-internal empty nucleus must receive phonetic interpretation regardless of inter-onset government if it is followed by a licensed empty nucleus.

4.2 The empty nucleus after either a fricative, affricate or negatively charmed segment

4.2.1 The data

Let us consider the examples given in (1) below as the first instance of unlicensed empty nuclei which are properly governable by a following nucleus.

(1) properly governable but unlicensed empty nuclei

a. after a fricative

/p ^o us ^o v ^o rəm ^o /	[p ^o us ^o ɪrəm]	'ulcer'
/k ^o as ^o v ^o na/	[k ^o as ^o ɪna]	'girl'
/k ^o ak ^o as ^o v ^o ro/	[k ^o ak ^o as ^o ɪro]	'narrowly'
/k ^o os ^o v ^o pherv ^o /	[k ^o os ^o ɪphel]	'gospel'
/k ^h v ^o ris ^o v ^o chan ^o /	[k ^h iris ^o ɪchan]	'christian'

/hos ^o v ^o thes ^o v ^o /	[hos ^o <u>i</u> thes ^o i]	'hostess'
/həs ^o v ^o k ^{hi} /	[həs ^o <u>i</u> k ^{hi}]	'huskey (voice)'
/p ^h as ^o v ^o therv ^o /	[p ^h as ^o <u>i</u> thel]	'pastel'

b. after an affricate

/k ^o ac ^o v ^o rənv ^o /	[k ^o ac ^o <u>i</u> rən]	'be in order'
/k ^o oc ^o v ^o nək ^o v ^o /	[k ^o oc ^o <u>i</u> nək ^o]	'be silent'
/əc ^o v ^o p ^o ə/	[əc ^o <u>i</u> p ^o ə]	'alas'
/s ^o v ^o c ^o v ^o k ⁱ /	[s ^o ic ^o <u>i</u> k ⁱ]	(Japanese proper name)
/ac ^o v ^o thæk ^o v ^o /	[ac ^o <u>i</u> thæk ^o]	'Aztec'

c. after tensed or aspirated segments

/k'ak'v ^o rak ^o i/	[k'ak' <u>i</u> rak ^o i]	'bits of rice'
/k'jac'v ^o mak ^o v ^o /	[k'jac' <u>i</u> mak ^o]	'slender'
/s ^o öt'v ^o k ^o i/	[s ^o öt' <u>i</u> k ^o i]	'a horsetail'
/t ^o ərv ^o k ^h v ^o t ^o ək ^o v ^o /	[t ^o əlkh ⁱ <u>i</u> t ^o ək ^o]	'click'
/nap ^h v ^o tharv ^o rinv ^o /	[nap ^h <u>i</u> thallin]	'naphthalene'

In the above examples, the underlined [i] is the phonetic manifestation of an unlicensed empty nucleus. Notice that this position is followed by another nucleus that is lexically filled. That is, the empty nucleus in the above words is a potential governee, and the following nucleus is a potential governor. Following proper government, this position ought to be licensed, and need not be phonetically realised. However, it appears that the empty nuclei in the above data resist proper government. What is of importance is that the consonants appearing before the empty nuclei are either fricatives, affricates, or tensed or aspirated segments. Indeed, in such cases, all Korean words must phonetically interpret the domain-internal empty nucleus. Let us discuss this phenomenon within the framework of GP in the following section.

4.2.2 The licensing properties of the domain-internal empty nucleus

In the previous chapter, we saw that fricatives, affricates, or tensed or aspirated segments (more precisely, certain elements they contain) cannot be licensed by a licensed empty nucleus. In other words, they can only be licensed by an unlicensed nucleus. At this point in our discussion, the segments (or elements) are followed by an empty nucleus that is properly governable. In the following pages, let us consider how a language chooses between two possibilities when the following two notions are in conflict. Recall that:

- (2) a. A properly governed (or a licensed) empty nucleus may not be phonetically realised.
- b. Certain elements can be licensed only by an unlicensed nucleus.

Consider the situation where a properly governable empty nucleus is preceded by an onset which dominates a segment containing the elements that can be licensed only by an unlicensed nucleus. The two processes are in conflict, with two options: the first option is 'onset-dominant', whereby the empty nucleus resists licensing in order to save the preceding onset segment; the second option is 'nucleus-dominant', whereby an empty nucleus is licensed and causes the preceding onset segment to alternate with one which can be licensed by a licensed empty nucleus. Korean manifests both cases: domain-internal empty nuclei are derived in the former instance, and domain-final empty nuclei in the second.

4.2.2.1 Nucleus-dominant: domain-final empty nuclei in Korean

Let us first consider what the situation would be if, in cases where the above two conditions in (2) are in conflict, a language chooses the licensing of an empty nucleus over the licensing of the preceding onset segment. In this case, an empty nucleus that is properly governable would be interpreted as zero. Since this nucleus cannot be a licenser for the preceding onset segment, there must be segmental change in the preceding onset.

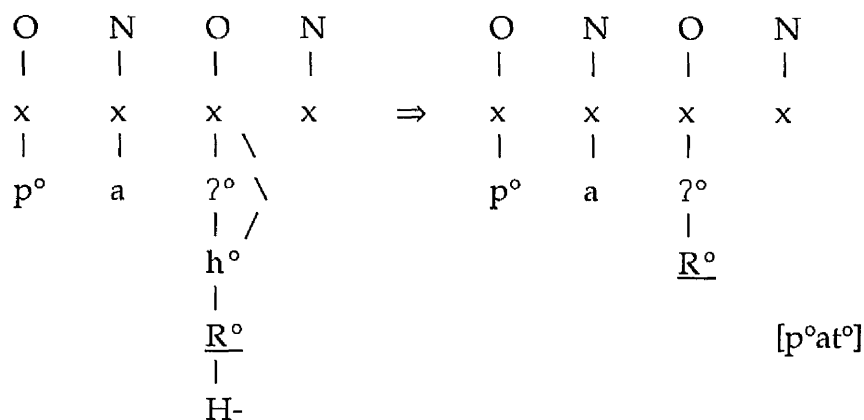
In order to illustrate this, let us consider domain-final empty nuclei in Korean. In fact, we have already seen this case in the preceding chapter. That is, the segments containing the elements which are licensed only by an unlicensed nucleus alternate with a corresponding neutral stop before a domain-final empty nucleus (cf. Final Obstruent Neutralisation). Some simple examples are given in (3) below.

(3)	stem		stem + /e/ 'at'	gloss
	/p°ak°v°/	[p°ak°]	[p°ak°e]	'outside'
	/p°uək°h°v°/	[p°uək°]	[p°uək°he]	'kitchen'
	/ip°h°v°/	[ip°]	[ip°he]	'leaf'
	/p°at°h°v°/	[p°at°]	[p°at°he]	'field'
	/nac°v°/	[nat°]	[nac°e]	'daytime'
	/k°oc°h°v°/	[k°ot°]	[k°oc°he]	'flower'
	/os°v°/	[ot°]	[os°e]	'clothes'

Again, from the examples where the suffix /e/ 'at' is added, we can confirm that the underlying representations of the stems contain either a fricative, affricate, or a negatively charmed segment in the final onset. Recall that these segments contain the elements that need to be

licensed by the following unlicensed empty nucleus. However, the following empty nucleus is licensed by virtue of its final position, thus, it cannot license the preceding onset that contains such a segment. Two possible phonological processes are in conflict. If domain-final empty nuclei in Korean took the first option, the domain-final empty nucleus would resist licensing, and could preserve the preceding onset segment. However, since domain-final empty nuclei in Korean are always licensed, they have to choose the second option. They choose to be licensed rather than to license the onset segment. Therefore, the process of 'Final Obstruent Neutralisation' applies to the onset. This is shown below in (4), where the word /p^oat^hv^o/ [p^oat^o] 'field' is illustrated.

(4) Nucleus-dominant: /p^oat^hv^o/ [p^oat^o] 'field'



4.2.2.2 Onset-dominant: domain-internal empty nuclei in Korean

That Korean pronounces a domain-internal empty nucleus in this situation, as can be seen in (1), shows that, given the two options, domain-internal empty nuclei preserve the licensing of the preceding

onset segment at the cost of being licensed through proper government. This means that a domain-internal empty nucleus in Korean resists proper government if the preceding onset dominates a segment containing the elements which must be licensed by an unlicensed nucleus. The domain-internal empty nucleus fails to be licensed, thus, is phonetically interpreted in order that the preceding onset that contains such a consonant be licensed. This is shown below in (5).

- (5) a. an empty nucleus preceded by a fricative:

/p^has^ov^ot^herv^o/ 'pastel'¹

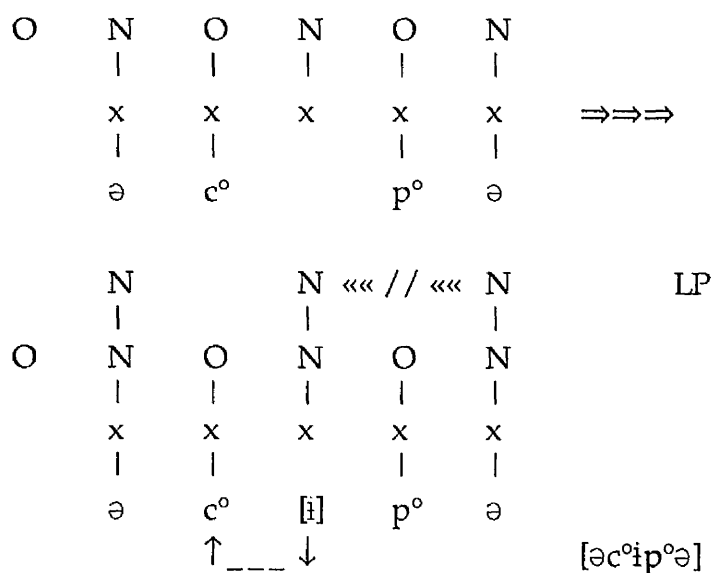
O	N	O	N	O	N	O	N	
x	x	x	x	x	x	x	x	⇒⇒⇒
p ^h	a	s ^o		t ^h	e	r		

			N «« // «« N				
O	N	O	N	O	N	O	N
x	x	x	x	x	x	x	x
p ^h	a	s ^o	[i]	t ^h	e	r	
		↑---	↓				[p ^h as ^o i ^t h ^e l]

¹In this structure, we do not consider the alternation of /r/ with [l]. See Chapter Two for a detailed discussion.

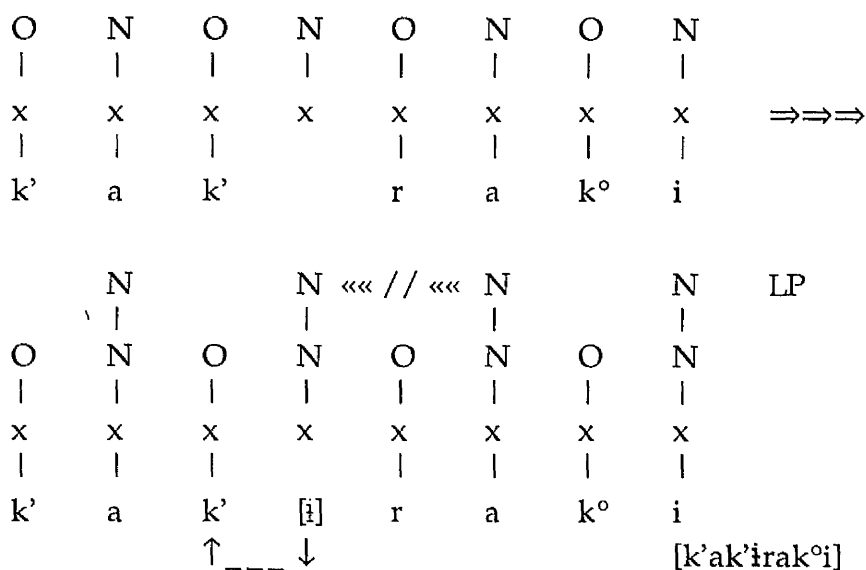
b. an empty nucleus preceded by an affricate:

/əc°v°p°ə/ 'alas'



c. an empty nucleus preceded by a negatively charmed segment:

/k'ak'v°rak°i/ 'bits of rice'



We have so far discussed how an empty nucleus fails to be properly governed (i.e. licensed) if it is preceded by either a fricative, affricate, or a negatively charmed segment. We have discovered that in Korean, a

domain-internal empty nucleus that is preceded by any such segment resists proper government, so that the preceding onset segment may be preserved. Domain-final empty nuclei in Korean, on the other hand, take the other option, so that the onset segment undergoes so-called 'Final Obstruent Neutralisation' and vocalisation respectively.

4.3 Domain-initial empty nuclei

In this section, let us consider the domain-initial empty nuclear position, where proper government again fails to apply. Consider the following words in (6).

(6) domain-initial empty nuclear position

/nv°k'i/	[nᵢk'i]	'to feel'
/nv°tʰari/	[nᵢtʰari]	'agaric'
/k°v°cʰi/	[k°ᵢcʰi]	'to stop'
/k°v°manv°/	[k°ᵢman]	'no more'
/s°v°cʰi/	[s°ᵢcʰi]	'to go by'
/s°v°murv°/	[s°ᵢmul]	'twenty'
/t°v°murv°/	[t°ᵢmul]	'be rare'
/c°v°rənv°/	[c°ᵢrən]	'abundant'
/t°v°næk°i/	[t°ᵢnæk°i]	'tramp'

The domain-initial nuclei of the above words are phonetically interpreted even though they have a potential proper governor to their right. We note that this phenomenon is not an idiosyncratic property of Korean but is common to a number of languages, such as Parisian French (Charette 1990b), and Tonkawa (Y. Yoshida 1990). In the schwa-zero alternation of Parisian French, for instance, the domain-initial

nuclear position is not subject to proper government, whereas the same position respects proper government in Quebec French, if the proper governor receives stress.² Observe the following examples in (7).

(7)	Quebec Fr.	Parisian Fr.		
	petit	[péí]	[pəí]	'small'
	petitesse	[pətités]	[pətités]	'smallness'
	cheval	[ʃfál]	[ʃəvál]	'horse'
	chevalier	[ʃəvalié]	[ʃəvalié]	'knight'

As can be seen in (7), the words 'petit' and 'cheval' have the stress on the second nuclear position. The domain-initial empty nucleus is properly governed by the following stressed vowel in Quebec French, whereas this position resists proper government in Parisian French. Thus, schwa does not manifest itself in the former language, but is present in the latter.

The same process can also be observed in Tonkawa. Stated informally, in this language any vowel undergoes elision if the following vowel is present (cf. 8a). However, the domain-initial nuclear position is inaccessible to this process (cf. 8b).

(8) vowel-zero alternation in Tonkawa (Y. Yoshida 1990: 54-55)

a.	picno?	'he cuts it'
	notxo?	'he hoes it'
	netlo?	'he licks it'
	naxco?	'he makes it a fire'
b.	picen	'castrated one, steer'
	notox	'hoe'

²The reader should note that stress in French falls on the final unlicensed nucleus.

As for this process, Y. Yoshida (1990: 59) proposes that the first nucleus of Tonkawa is inaccessible to phonological processes. Her proposal is also applicable to Korean. There are no words in Korean where a domain-initial nuclear position is realised as zero, i.e. no apparent initial clusters are observed. Therefore, proper government fails to apply here. I shall take the form /k^ov^omanv^o/ [k^oi^oman] 'no more' as an example.

(9) /k^ov^omanv^o/ [k^oi^oman] 'no more'

	N	««	//	««	N	LP
O	N	O	N	O	N	
x	x	x	x	x	x	
k ^o	[i]	m	a	n		

We have so far considered empty nuclei that are properly governable but are unlicensed, and thus always receive phonetic realisation: these were (a) empty nuclei after fricatives, affricates, or negatively charmed segments, and (b) domain-initial empty nuclei.

In the following section, let us consider other cases where an empty nucleus is properly governable, but is phonetically interpreted.

4.4 Governing relations between two onsets and the licensing of intervening empty nuclei

The discussion up to this point can be summarised as follows: the licensing of a domain-internal empty nucleus in Korean respects

proper government (cf. Chapter 3), except in the two cases that are discussed in 4.2-4.3. Following this, we may expect all other domain-internal empty nuclear positions to be accounted for by a single notion of proper government. However, as seen in Chapter 1, the presence and absence of the vowel [i] is not only controlled by the presence and absence of the following vowel, but is also determined by the relation between the surrounding consonants. This relation is called a 'governing relation'. Let us discuss the governing relation between consonants in detail.

4.4.1 Governing relations between consonants

GP claims that there is a governing relation between adjacent consonants, and it is determined by the charm value and/or complexity of a segment. In most cases, a governor is a segment that is negative in charm value, whereas a governee is a segment that is neutral. Thus, a governing consonant is a segment that usually contains H^- or L^- . In Korean, negatively charmed segments contain H^- , and thus, they are potential governors. Let us repeat the representations of the negatively charmed segments.

(10) a. tensed segments

p'	t'	k'	c'	s'
x	x	x	x	x
ɔ°	ɔ°	ɔ°	ɔ°	|
<u>U°</u>	|	|	|	|
|	<u>R°</u>	|	<u>R°</u>	<u>R°</u>
|	|	<u>v°</u>	|	|
|	|	|	I°	|
h°	h°	h°	h°	h°
H-	H-	H-	H-	H-

b. aspirated segments

p ^h	t ^h	k ^h	c ^h
x	x	x	x
\	\	\	\
ɔ° \	ɔ° \	ɔ° \	ɔ° \
/	/	/	/
h°	h°	h°	h°
<u>U°</u>	<u>R°</u>	<u>v°</u>	<u>R°</u>
|	|	|	I°
H-	H-	H-	H-

However, there exist some cases where a neutrally charmed segment may govern another neutrally charmed segment, provided that it contains no fewer elements than the governee.

(11) Complexity Condition (Harris 1990: 274)³

Let α and β be segments occupying the positions A and B respectively. Then if A governs B, β must be no more complex than α .

According to this condition, the governing relations between neutral consonants are determined by the number of elements they contain.

Consider the representations of the neutrally charmed segments.

(12)	p°	t°	k°	c°	s°	m	n	ŋ	r	h
	x	x	x	x	x	x	x	x	x	x
	ʔ°	ʔ°	ʔ°	ʔ°	h°	ʔ°	ʔ°	ʔ°	|	h°
	<u>U°</u>	<u>R°</u>	<u>v°</u>	<u>R°</u>	|	<u>U°</u>	|	|	|	|
	|	|	|	|	<u>R°</u>	|	<u>R°</u>	|	<u>R°</u>	|
	|	|	|	I°	|	|	|	<u>v°</u>	|	|
	|	|	|	|	N ⁺	N ⁺	N ⁺			
	h°	h°	h°	h°	|	|	|	|	|	|
					L ⁻	L ⁻	L ⁻			

Nasals, which contain four elements, are the best governors among neutral segments, and /r/ (and the glides /I°/ (i.e. [j]) and /U°/ (i.e. [w]) if they appear in an onset position), which contain(s) only one element, is/are the better governee(s). We can therefore formulate the following governing relations for Korean consonants.

³The Complexity Condition was first proposed in KLV (1990).

- (13) The consonantal Governing relations based on Charm value and the Complexity Condition

segments	r, liquids	neutral obstruents	nasals	tensed, aspirated
charm	neutral			negative
No. of elements	1	2 ~ 3	4	
governing potential	<div style="display: flex; justify-content: space-between; align-items: center;"> < ----- -----> </div> <div style="display: flex; justify-content: space-between; align-items: center;"> better governee better governor </div>			

With these governing properties in mind, let us discuss the contexts responsible for the blocking of proper government by the consonants surrounding an empty nucleus.

4.4.2 Failure of inter-onset government blocks proper government

In chapter 1, we saw that the presence or absence of the vowel [i] is systematically controlled by the quality of the surrounding consonants. This can be summarised as in the table in (14), below.

- (14) The [i]-zero alternation between two consonants

context: C₁ v° C₂ V

C ₁	C ₂	liquid	nasal	neutral obstruent	tensed or aspirated
liquid		ø	ø	ø	ø
nasal		i	ø	ø*	ø
neutral stop		i	i*	i*	ø

This table shows that the licensing of an empty nucleus (i.e. the [i]-zero alternation) in domain-internal position is by and large related to government between the two consonants that surround it. That is,

apart from the cases where an asterisk (*)⁴ is indicated, it is possible to say that an empty nucleus is not phonetically realised if the consonant in the following onset governs the one in the preceding onset, whereas it receives phonetic interpretation if the consonant in the following onset cannot govern the preceding one. We call the governing relation between two onsets 'inter-onset government' (cf. Heo 1991a&b, 1992), and this government applies from right to left (at least in Korean).

In order to demonstrate this aspect concretely, and to define it in a formal way, let us consider the data column by column.

4.4.2.1 Empty nuclei before a liquid

We will begin with the case where a properly governable empty nucleus is followed by a liquid, and is preceded by another consonant. Observe the following examples in (15). Note that we will not consider the case where an empty nucleus is preceded by a negatively charmed segment, a fricative, or an affricate, because it was dealt with in the preceding section.

⁴These exceptional cases are divided into two groups. Firstly, government between neutral obstruents (or stops) does not respect the Complexity Condition, even though the two consonants are identical (e.g. *[k°k°]), or the preceding consonant is inferior to the following one in complexity (e.g. *[k°c°]). It should be recalled that the presence of [i] between negatively charmed segments is discussed in the preceding section: an empty nucleus preceded by a negatively charmed segment is always unlicensed. Secondly, neither the sequence involving a nasal followed by a neutral obstruent, nor the reverse sequence, respects the Complexity Condition. According to this condition, an empty nucleus in the former case should be phonetically interpreted, and it should not be phonetically realised in the latter. However, Korean manifests the opposite results. These will be discussed shortly.

(15) a. liquid + v° + liquid + V

/k°ərv°re/	[k°əlle]	'dustclothes'
/k°ə:rv°raŋv°/	[k°ə:llaŋ]	'meat on the rib'
/p°ərv°re/	[p°əlle]	'insect'
/p°arv°ri/	[p°alli]	'to open'
/t°arv°ræ/	[t°allæ]	'to soothe'
/t°a:rv°ra/	[t°a:lla]	'to request'
/no:rv°ra/	[no:lla]	'to surprise'
/na:rv°rjəp°v°/	[na:lljəp°]	'be quick'

b. nasal + v° + liquid + V

/mjənv°ri/	[mjənɿri]	'son's wife'
/c°inv°rəmi/	[c°inɿrəmi]	'fin'
/k°ənv°ri/	[k°ənɿri]	'to lead'
/omv°ri/	[omɿri]	'to shut'
/k°v°rəmv°ro/	[k°irəmiro]	'therefore'

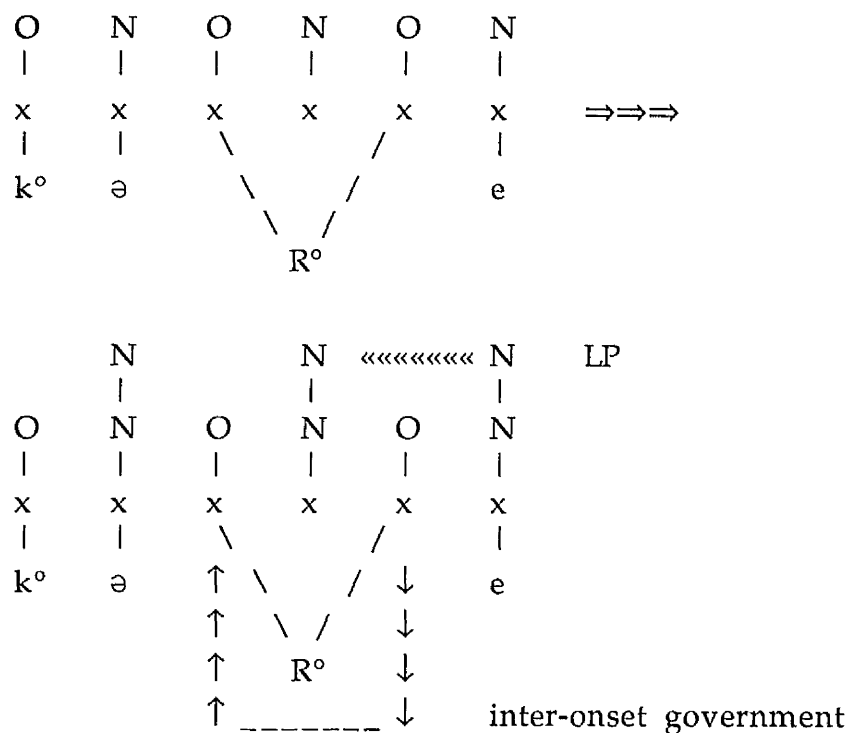
c. neutral stop + v° + liquid + V

/k°ot°v°rv°mv°/	[k°ot°ɿrim]	'icicle'
/jət°v°rv°mv°/	[jət°ɿrim]	'pimple'
/s°inap°v°ro/	[s°inap°ɿro]	'gradually'
/s°ik°v°rək°i/	[s°ik°ɿrək°i]	'to vanish'
/t°ut°v°rək°i/	[t°ut°ɿrək°i]	'rash'
/jət°v°re/	[jət°ɿre]	'8th day'

The empty nucleus in (15a) poses no problem. That is, it is adjacent to a proper governor at the level of LP, and the consonants surrounding it are identical, thus, they contain the same number of elements. Recall that the Complexity Condition allows a governing relation between ^(a) two onsets that contain the same number of elements. Thus, nothing prevents the intervening empty nucleus from being properly governed, therefore, it is not phonetically manifested. This is illustrated below in (16), where the word /k°ərv°re/ [k°əlle]

'dustclothes' is taken as an example. Note that we assume that there is a single R° in this word.

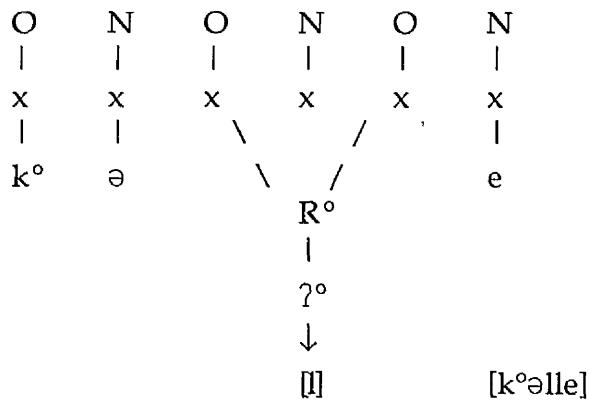
(16) liquid + v° + liquid + V: /k $^\circ$ ərv $^\circ$ re/ 'dustclothes'



The above derivation shows the process of the licensing of a properly governable empty nucleus by virtue of inter-onset government. If inter-onset government is formed between the two consonants surrounding a properly governable empty nucleus, it allows the licensing of the empty nucleus.

Before considering the case where a properly governable empty nucleus fails to be licensed, let us complete the above derivation. What is required is the segmental change of /r/ to [l]. As we have seen in Chapter 2, /r/ followed by a licensed empty nucleus will be realised as [l]; adding $?^\circ$ to R° produces [l], as in (17). The second /r/ also obtains $?^\circ$, deriving [l], so that inter-onset government is maintained.

(17) liquid + v° + liquid + V: /k°ərv°re/ 'dustclothes'



Let us now consider the empty nuclei, printed in bold in (15b&c). They either have a potential proper governor to their right (e.g. /k°ənv°ri/ [k°əniɹi] 'to lead'), or are the first member of two successive domain-internal empty nuclei (e.g. /k°ot°v°rv°mv°/ [k°ot°iɹim] 'icicle'). If nothing prevents proper government from applying, we would expect that the empty nucleus would not be phonetically interpreted, because the following (empty) nucleus is unlicensed. However, in the examples above, they invariably receive phonetic interpretation.

To see how inter-onset government affects the application of proper government, let us first consider the empty nucleus between the sequence involving a neutral stop and a liquid. Let us take the word /k°ot°v°rv°mv°/ [k°ot°iɹim] 'icicle' as an example (cf. 18b), and compare it with /s°arv°k°v°nv°/ [s°alk°in] 'with a rustle' (cf. 18a)⁵, in which the sequence is reversed in the same position, and the intervening nuclear position is not phonetically manifested.

⁵This word and some similar forms will be seen in Chapter 4.2.2.3., where the empty nucleus before a neutral obstruent is considered.

(18) a. liquid + v° + obstruent + V: /s°arv°k°v°nv°/ 'with a rustle'

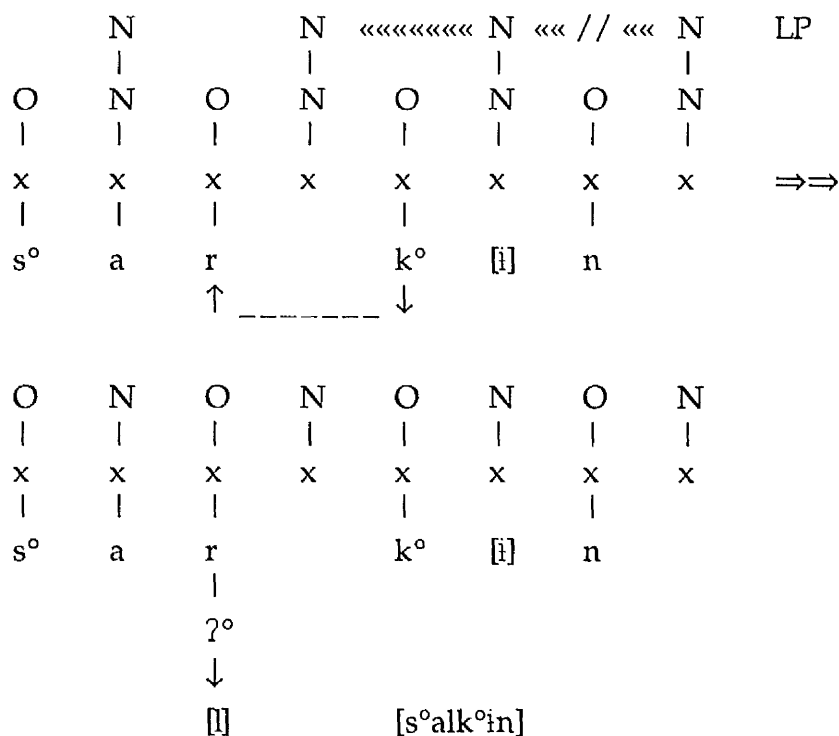
O	N	O	N	O	N	O	N
x	x	x	x	x	x	x	x
s°	a	r		k°		n	

b. obstruent + v° + liquid + V: /k°ot°v°rv°mv°/ 'icicle'

O	N	O	N	O	N	O	N
x	x	x	x	x	x	x	x
k°	o	t°		r		m	

Let us first consider (18a). The final nucleus of this structure is empty. As mentioned in the previous chapter, domain-final empty nuclei in Korean are licensed. Since the nucleus is itself licensed, it would not be phonetically interpreted, and it cannot be a proper governor for the preceding empty nucleus. An empty nucleus whose proper governor is licensed must receive a phonetic interpretation, whether or not inter-onset government applies. The penultimate nucleus is thus phonetically manifested. On the other hand, the antepenultimate nucleus is licensed: it is followed by an unlicensed empty nucleus, and the penultimate onset containing the neutral obstruent /k°/ can govern the preceding onset which dominates /r/. Inter-onset government, established between the two onsets, allows the intervening empty nucleus to be properly governed by the proper governor to its right. We get the desired result by adding ?° to the /r/ preceding the licensed empty nucleus: [s°alk°in]. This is illustrated in (19).

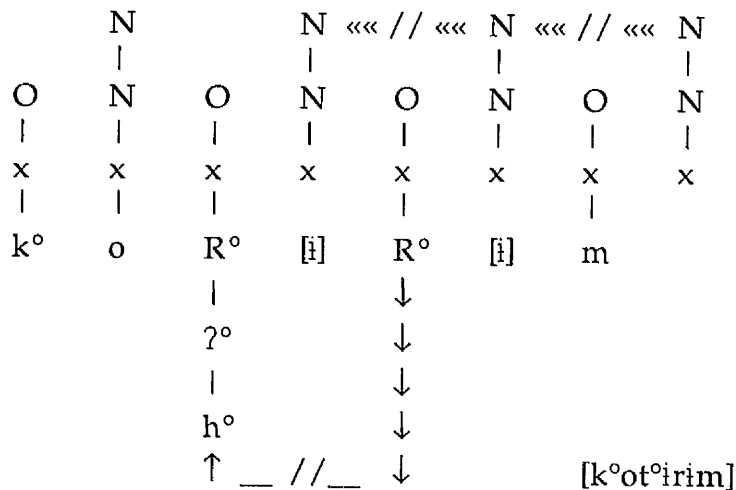
(19) /s°arv°k°v°nv°/ 'with a rustle'



Let us now consider the structure (18b). The situation up to the penultimate nucleus is same as in (18a): the final empty nucleus that is itself licensed would not have phonetic interpretation, and it cannot be a proper governor for the preceding empty nucleus. The penultimate empty nucleus is thus phonetically manifested. Note that /r/ before an unlicensed empty nucleus does not undergo segmental change.

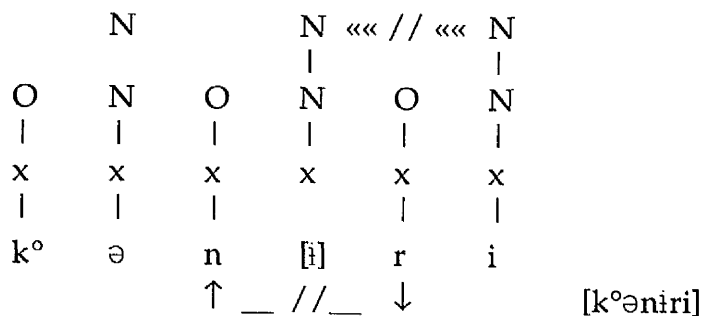
However, the situation is different for the antepenultimate nucleus. This position in (18b) is phonetically realised even though it has a potential proper governor to its right, because the failure of inter-onset government blocks proper government. Recall that /r/ contains less elements than /t°/, which has three elements, and so the former cannot govern the latter, as per the Complexity Condition. An empty nucleus that is not properly governed cannot be licensed, and should be phonetically interpreted. This is shown in (20).

(20) /k^oot^ov^orv^omv^o/ 'icicle'



Finally, the fact that the domain-internal empty nucleus between the ordered sequence of a nasal and a liquid in (15b) receives phonetic interpretation can be explained in the same way. Consider the following structure where the word /k^oən^ori/ [k^oəniri] 'to lead' is taken as an example.

(21) liquid + v^o + nasal + V: /k^oən^ori/ [k^oəniri] 'to lead'



As can be seen in the above structure, the empty nucleus is properly governable by the following unlicensed nucleus dominating the vowel /i/. However, inter-onset government fails to apply because the potential governor containing /r/ cannot govern the potential governee containing /n/. Simply, /n/ consists of four elements and

cannot be governed by /r/, which consists of a single element, R°. The failure of inter-onset government blocks proper government. Thus, the empty nucleus is phonetically manifested, resulting in [k°əniri].

4.4.2.2 Empty nuclei before a nasal

We have seen in the above discussion that a properly governable empty nucleus cannot be properly governed if inter-onset government between the two onsets surrounding it fails to apply. In this section, let us consider empty nuclei before nasals, by observing the data given below in (22).

(22) a. liquid + v° + nasal + V⁶

/ərv°ma/	[əлма]	'how much'
/s'ərv°mæ/	[s'əlmæ]	'sledge'
/k°o:rv°møk°v°/	[k°o:lmøk°]	'alleyway'
/p ^h arv°mæ/	[p ^h almæ]	'throwing'
/s°arv°mjəs°i/	[s°almjəs°i]	'secretly'
/k°a:rv°mi/	[k°a:lmi]	'sea cucumber'
/t°v°rv°me:/	[t°ilmē:]	'to tie'
/t°v°rv°mæk°i/	[t°ilmæk°i]	'to shake'

b. nasal + v° + nasal + V

/k°ə:nv°nə/	[k°ə:nnə]	'to cross'
/ən ^v ni/	[ənni]	'sister'
/s°im ^v mani/	[s°immani]	'ginseng-diggers'
/a:m ^v man ^v °/	[a:mman]	'amount'

⁶Recall that Korean does not allow the sequence [-ln-]. When two segments are next to each other by suffixation, the sequence is realised as either [ən] or [ll]: e.g. /u:r + ni/ 'to cry + because' --> [u:ni], and /c°ur + nəm^ki/ 'rope + skipping' --> [c°ulləm^ki]. I do not have a solution to this problem as yet.

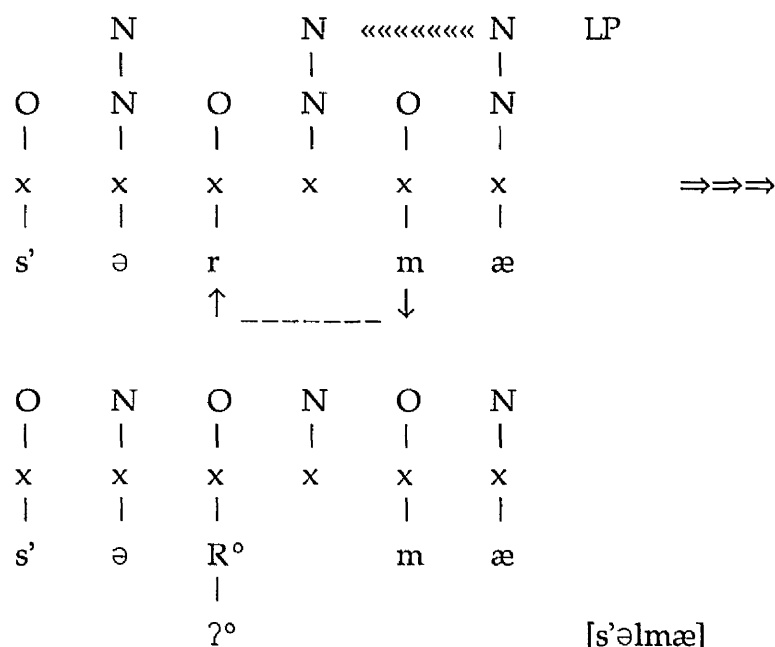
/k°umv°nirv°/	[k°umnil]	'do a stretch-up'
/k'amv°njaŋv°/	[k'amnjaŋ]	'ability'
/p°aŋv°maŋi/	[p°aŋmaŋi]	'a club'
/əŋv°maŋv°/	[əŋmaŋ]	'a mess'
/maŋv°nani/	[maŋnani]	'wretch'
/s°əŋv°njaŋv°/	[s°əŋnjaŋ]	'match'

c. neutral stop + v° + nasal + V

/nak°v°ne/	[nak°ine]	'stranger'
/s°ik°v°mchi/	[s°ik°imchi]	'spinach'
/s°v°rv°k°v°məni/	[s°ilk°iməni]	'secretly'
/t°ot°v°mi/	[t°ot°imi]	'sieve'

The examples in (22a) show that a properly governable empty nucleus followed by a nasal is licensed (i.e. is not phonetically realised) if a liquid precedes it. This is exactly opposite to the cases in (15b), where the empty nucleus is phonetically interpreted. Since both segments, /r/ and the nasal, are neutrally charmed, the governing relation between them is determined by the Complexity Condition. As seen above, nasals contain four elements and can govern /r/, which consists of a single element, R°. Therefore, the two consonants surrounding the empty nucleus in (22a) form an inter-onset governing domain, and the empty nucleus is eligible to be licensed. Again, /r/ in the preceding onset becomes [l] by addition of ?° before a licensed empty nucleus. This is seen in (23) below, where the word /s'ərv°mæ/ [s'əlmæ] 'sledge' is considered.

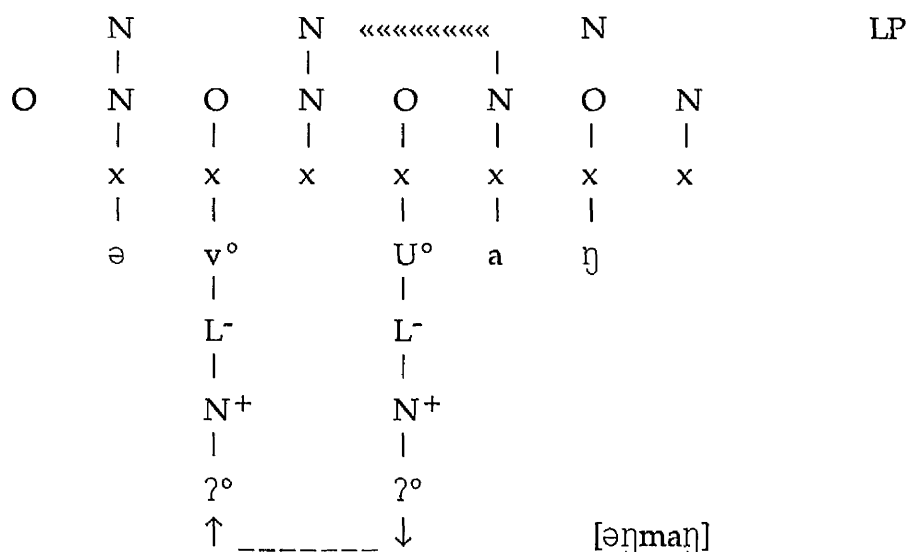
(23) liquid + v° + nasal + V: /s'ərɪv°mæ/ 'sledge'



Let us now move on to the cases in (22b), where an empty nucleus is surrounded by two nasal segments. These examples show that an empty nucleus is also licensed if it appears between nasals. Since the Complexity Condition allows a segment to govern another segment when both have the same number of elements, inter-onset government between nasals does not violate the condition.⁷ It is therefore the case that a properly governable empty nucleus between two nasals is licensed through proper government. We thus have no phonetic interpretation of an empty nucleus in this position. This is seen in (24), where the word /əŋv°maŋv°/ [əŋmaŋ] 'a mess' is taken as an example.

⁷We will return to this issue in Chapter 6, where the behaviour of the empty nucleus in verbal morphology is discussed.

(24) nasal + v° + nasal + V: /əŋv°maŋv°/ 'a mess'



Before discussing the licensing of an empty nucleus between a neutral stop and a nasal, which seems problematic,⁸ let us first discuss the empty nucleus followed by a neutral obstruent.

4.4.2.3 Empty nuclei before a neutral obstruent

In discussing the licensing of an empty nucleus before a neutral obstruent, an empty nucleus before a fricative or affricate should be considered, because it is *after* such segments that the empty nucleus is always unlicensed (cf. 4.2). Consider the examples in (25) following, where empty nuclei preceded by a liquid, a nasal, and another neutral obstruent, are shown.

⁸Following the Complexity Condition, the empty nucleus between a neutral stop and a nasal should be licensed, because the latter is more complex than the former. However, it appears that the empty nucleus is unlicensed.

(25) a. liquid + v° + neutral obstruent + V

/t'a:rv°k°i/	[t'a:lk°i]	'strawberry'
/s°arv°k°v°nv°/	[s°alk°in]	'with a rustle'
/p°a:rv°s°ö/	[p°a:ls°ö]	'spy'
/t'ə:rv°s°æ/	[t'ə:ls°æ]	'ornament'
/t'a:rv°p°o/	[t'a:lp°o]	'dwarf'
/k°arv°p°i/	[k°alp°i]	'rib'

b. nasal + v° + neutral obstruent + V

/s°o:ŋv°k°os°v°/	[s°o:ŋgot°]	'gimlet'
/t°oŋv°p°æ/	[t°oŋbæ]	'dividing'
/c°aŋv°t°ori/	[c°aŋdori]	'hammer'
/s°i:mv°p°urv°mv°/	[s°i:mburim]	'errand'
/namv°c°is°v°/	[namɕit°]	'over'
/c°amv°k°i/	[c°amgi]	'to sink'
/munv°t°v°k°v°/	[mundik°]	'suddenly'
/t°anv°k°orv°/	[t°angol]	'customer'
/s°ənv°p°i/	[s°ənbi]	'scholar'

c. neutral stop + v° + neutral obstruent + V

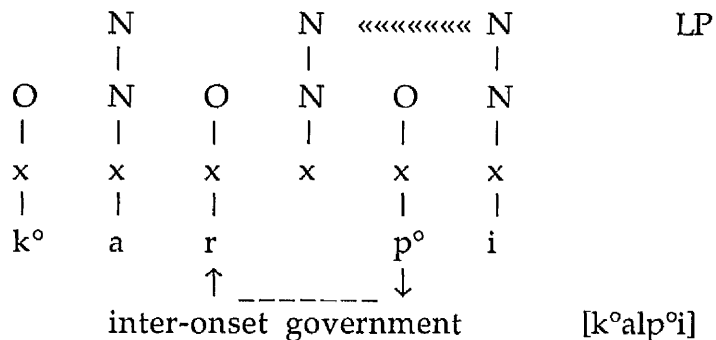
/c°ik°v°s°i/	[c°ik°is°i]	'patiently'
/p°ot°v°k°i/	[p°ot°ik°i]	'dwarf tree'
/c°inv°t°v°k°i/	[c°indik°i]	'tick'
/p°anv°t°v°s°i/	[p°andis°i]	'certainly'
/muŋv°k°v°c°ək°v°/	[muŋgic°ək°]	'linger'

The above words show that a properly governable empty nucleus before a neutral obstruent is not phonetically realised if the preceding consonant is either a liquid (cf. 25a) or a nasal (cf. 25b), but will receive phonetic interpretation if it is preceded by any other neutral obstruent (cf. 25c).

The words in (25a) contrast with the ones in (15c), where an empty nucleus had to be phonetically interpreted between the ordered

sequence of a neutral stop and a liquid. Thus, we can explain the licensing of the empty nuclei in (25a) as before: inter-onset government is formed between two onsets, and it allows the intervening empty nucleus to be properly governed by the potential proper governor to its right. The segment /r/, positioned before a licensed empty nucleus, must undergo segmental change by the addition of the occlusion element ʔ°. We thus produce forms where /r/ alternates with [l] and the following empty nucleus is not phonetically manifested.

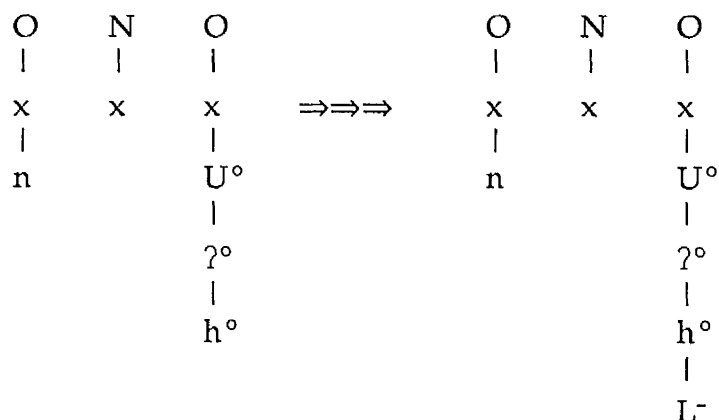
(26) liquid + ʋ° + neutral obstruent + V: /k°arv°p°i/ 'rib'



The examples in (25b) are problematic, however, for the Complexity Condition. Following the Complexity Condition, nasals are more complex than neutral obstruents. Hence, the neutral obstruents should not be able to govern the nasals. The intervening nuclear position should then remain unlicensed yielding, *[s°ənip°i]. However, the actual result is [s°ənbi].

What we should be aware of is that a neutral obstruent after a nasal always alternates with a negatively charmed segment that contains L⁻ (i.e. with a so-called 'voiced' consonant), as shown in (27) below.

(27) neutral obstruent after a nasal (e.g. /nv^op^o/ --> [nb])



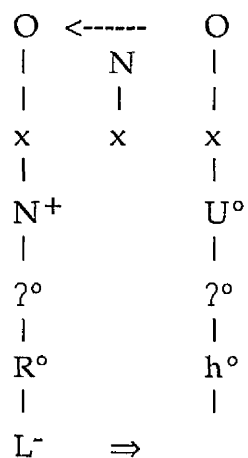
This process can be identified as composition (or strengthening). Concretely, the element L⁻ is added to the phonological representation of a segment that does not contain it underlyingly. Following Brockhaus (1992: 153), the composition process would increase the complexity of the affected segment.⁹ She claims that, in order for a segment to be strengthened, at least two conditions should be met. Firstly, the element which is obtained should have a local origin, i.e. it must spread from a neighbouring segment. Secondly, the affected segment should be in a governing position, where strengthening is in response to governing restrictions on charm and complexity.

It appears that both conditions are met in the situation in (27): firstly, there is a local source for the element L⁻. The preceding nasal contains this element. Secondly, the affected obstruents are in the potential governing position. The fact that the neutral obstruent in this position has governing work to do motivates the spreading process, to avoid the phonetic realisation of an intervening empty nucleus. The neutral obstruent is strengthened to become a negatively charmed segment by

⁹Note that Brockhaus (1992: 184f.) also claims that there are cases where the composition process does not affect the complexity of a segment. Briefly, the difference between the two cases is in whether the affected segment is the governor or the governee. The former may increase in complexity, while the latter may not.

the acquisition of L^- from the nasal in the governee position.¹⁰ This process produces a governing relation. This is illustrated below in (28).

(28) strengthening: (e.g. $/n(v^\circ)p^\circ/ \rightarrow [nb]$)



The examples in (25c) are also problematic for the Complexity Condition. A domain-internal empty nucleus between a neutral stop and a neutral obstruent is always phonetically realised. In principle, this is not what the Complexity Condition predicts. Following this condition, neutral segments can tolerate equal complexity for governor and governee. Thus, we would expect that the empty nuclei in (25c) would not be phonetically realised. Matters are made worse when we consider the sequence $/-k^\circ v^\circ c^\circ-/$ in $/mu\eta v^\circ k^\circ v^\circ c^\circ \partial k^\circ v^\circ/$ 'linger', where $/c^\circ/$ is more complex than $/k^\circ/$. Notice that this word is realised as $[mu\eta gic^\circ \partial k^\circ]$, not as $*[mu\eta g\partial c^\circ \partial k^\circ]$.

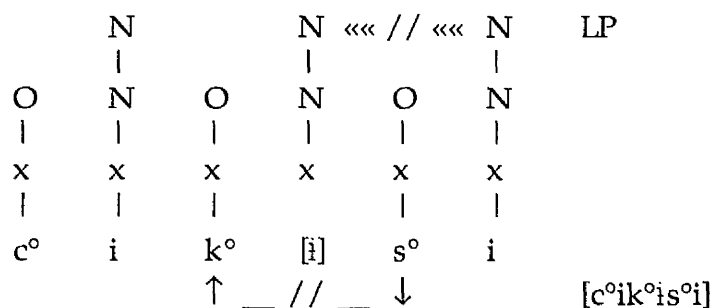
Note that Korean cannot have $C^\circ C^\circ$ clusters, where C° is a neutral obstruent. It appears that neutral stops cannot have just any neutral governor but require a governor to be negatively charmed,¹¹ as can be

¹⁰We will return to this issue in Chapter 6, where verbal suffixation is discussed.

¹¹According to Brockhaus (1992: 154f.), German manifests a similar process. That is, the sequence of a neutral obstruent followed by devoiced obstruent is impossible, where the latter is neutral by virtue of the loss of L^- .

seen in (29), where the word /c°ik°v°s°i/ [c°ik°is°i] 'patiently' is considered.

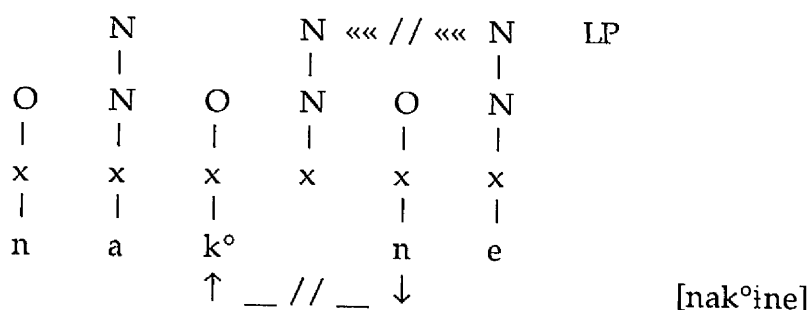
(29) neutral stop + v° + neutral obstruent + V: /c°ik°v°s°i/ 'patiently'



This property of a neutral stop (or neutral obstruents in the general sense) is different from that of other segments such as liquids and nasals, which tolerate equal complexity for governor and governee. The Complexity Condition proposed by Harris (1990) can account for the latter cases, but not for the former. The first version of the Complexity Condition, proposed by KLV (1990: 218), which states that a neutral segment may govern if it has a complexity greater than its governee, may account for the property of neutral stops, but it cannot solve the cases of liquids and nasals. We cannot help but admit at present that neutral obstruents cannot have a neutral governor.

We may now answer the question of why an empty nucleus intervening between neutral stops and nasals receives phonetic interpretation in Korean (cf. 25c), by saying that nasals are neutrally charmed, thus, they cannot be a governor for neutral stops (or obstruents).

(30) neutral stop + v° + nasal + V: /nak°v°ne/ 'passenger'



There is one possibility for the phonetic interpretation of the empty nucleus between a neutral obstruent and a nasal. This possibility comes from the process of obstruent nasalisation. It is by this process that the final obstruent of the stem (in both nouns and verbs) alternates with a corresponding nasal when certain types of nasal-initial analytic suffixes are added. Consider the following examples.

(31) a. noun + suffix

/c°ip°v°/ + /manv°/	[c°imman]	'house + only'
/os°v°/ + /manv°khv°mv°/	[onmank°im]	'clothes + as'
/p°uəkhv°/ + /mat°a/	[p°uəŋmat°a]	'kitchen + every'
/k°ochv°/ + /mac°ə/	[k'onmac°ə]	'flower + even'

b. verb + suffix

/c°ap°v°/ + /ni/	[c°amni]	'to catch (interrogative)'
/k°ə:t°v°/ + /nv°nv°/	[k°ə:nnin]	'to walk (present)'
/k°ək°v°/ + /ni/	[k°əŋni]	'to pick (interrogative)'
/c°ochv°/ + /nv°nv°/	[c'onnin]	'to chase (present)'

What is interesting is that obstruent nasalisation also applies across a syntactic domain. Concretely, Korean may omit nominal suffixes in certain circumstances, and consequently, we may have the situation where subject and verb, or object and verb, are next to each other. Let us now observe the case where the first word ends in an obstruent and

is followed by a nasal which is the initial segment of the second word (cf. 32). We observe that the final obstruent in the preceding word never fails to undergo nasalisation.

(32) a. object + verb

t'ə ^o k ^o # mək ^o -	[t'əŋmək ^o -] (*[t'ək ^o mək ^o -])
'rice cake + to eat'	
k ^o ap ^o # nəri-	[k ^o am ^o nəri-] (*[k ^o ap ^o nəri-])
'price + to reduce'	
os ^o # mant ^o il-	[onmat ^o il-] (*[ot ^o mat ^o il-])
'clothes + to make'	
k'och ^h # nari-	[k'on ^o nari-] (*[k'ot ^o nari-])
'flower + to carry'	

b. subject + verb

p ^o uə ^h k ^h # nə:l-	[p ^o uəŋnə:l-] (*[p ^o uək ^o nəl-])
'kitchen + be big'	
t ^o ap ^o # mac ^o -	[t ^o ammat ^o -] (*[t ^o ap ^o mat ^o -])
'answer + be right'	
os ^o # ma:n(h)-	[onma:n(h)-] (*[ot ^o man(h)-])
'clothes + be plenty'	
k'och ^h # nam-	[k'on ^o nam-] (*[k'ot ^o nam-])
'flower + remain'	

c. subject or object + adverb (+ verb)

c ^o ip ^o # mop ^o s'i (# c ^o ak ^o -)	[c ^o immop ^o s'i-] (*[c ^o ip ^o mop ^o s'i-])
'house (subj.) + very (+ be small)'	
s ^o os ^o ik ^o # nil (# t ^o it ^o -)	[s ^o os ^o iŋnil-] (*[s ^o os ^o ik ^o nil-])
'news (obj.) + always (+ to hear)'	

It should be noted that, apart from nasalisation, no processes apply across a syntactic domain. For instance, tensification, which is a widespread phenomenon in Korean, is observed in suffixation as well

as in compounds (cf. 33a&b).¹² However, this process can never be found across a syntactic domain (cf. 33c-e).

(33) a. suffixation¹³

/c°ip°v°/ + /k°wa/	[c°ip°k'wa]	'house + and'
/k°uk°v°/ + /t°o/	[k°uk°t'o]	'soup + as well'
/k°och°v°/ + /p°ot°a/	[k°ot°p'ot°a]	'flower + rather than'
/k°ət°v°/ + /k°i/	[k°ət°k'i]	'to collect (gerundive)'
/t°əph°v°/ + /c°a/	[t°əp°c'a]	'to cover (imperative)'
/c°och°v°/ + /s°o/	[c°ot°s'o]	'to chase (interrogative)'

b. compound

/k°och°v°/ + /c°ip°v°/	[k°ot°c'ip°]	'flower + house (shop)'
/os°v°/ + /k°ak°e/	[ot°k'ak°e]	'clothes + shop'
/t°ok°v°/ + /s°a/	[t°ok°s'a]	'poison + snake'
/s°ip°v°/ + /t°v°ŋv°/	[s°ip°t'ŋ]	'10th + grade'
/nac°v°/ + /p°amv°/	[nat°p'am]	'day + night'

¹²Tensification refers to a process where a neutral obstruent alternates with its tensed counterpart after another consonant across a licensed empty nucleus. I claim that tensification applies in order to form inter-onset government between the two onsets.

¹³I would like to note that the suffixes that trigger nasalisation or tensification are analytic. As shall be seen in the following chapters, Suffixes are added to the stem either analytically or non-analytically. The former divides the stem and the suffix into different domains, i.e. /[[A] B]/ or /[[A] [B]]/, and the latter treats the stem and the suffix as a morphologically simplex word, having only a single domain, i.e. /[AB]/. Thus, in analytic morphology, the stem ending in a consonant must have an empty nucleus at the end of domain. The claim that the suffixes in (31&33) are analytic follows from the fact that they contrast with forms such as /c°ap°v°/ 'to catch' + /na/ 'but' --> [c°ap°ina] and /, /k°ət°v°/ 'to collect' + /s°i/ (respective) --> [k°ət°is°i], where the suffixes are added non-analytically, and the empty nucleus between stem and suffix is phonetically realised (cf. Chapter 6).

c. object + verb

c°ip° # c°i:s°-	[c°ip°c°i:t°-] (*[c°ip°c°i:t°-])	'house + to build'
os° # t°ari-	[ot°t°ari-] (*[ot°t°ari-])	'clothes + to iron'
chæk° # p°əri-	[chæk°p°əri-] (*[chæk°p°əri-])	'book + to throw'
mok° # k°up°uri-	[mok°k°up°uri-] (*[mok°k°up°uri-])	'neck + to bend'

d. subject + verb

c°ip° # c°oh-	[c°ip°c°oh-] (*[c°ip°c°oh-])	'house + be good'
os° # t°ə:rəp°-	[os°t°ə:rəp°-] (*[os°t°ə:rəp°-])	'clothes + be dirty'
t°ok° # p°i-	[t°ok°p°i-] (*[t°ok°p°i-])	'jar + be empty'
mok° # k°il-	[mok°k°il-] (*[mok°k°il-])	'neck + be long'

e. subject or object + adverb (+ verb)

c°ip° # t°æt°anhi (# c°ak°-)	[c°ip°t°æt°anhi-] (*[c°ip°t°æt°anhi-])	'house (subj.) + very (+ be small)'
s°os°ik° # k°ak°im (# t°it° -)	[s°os°ik°k°ak°im-] (*[s°os°ik°k°ak°im-])	'news (obj.) + occasionally (+ to hear)'

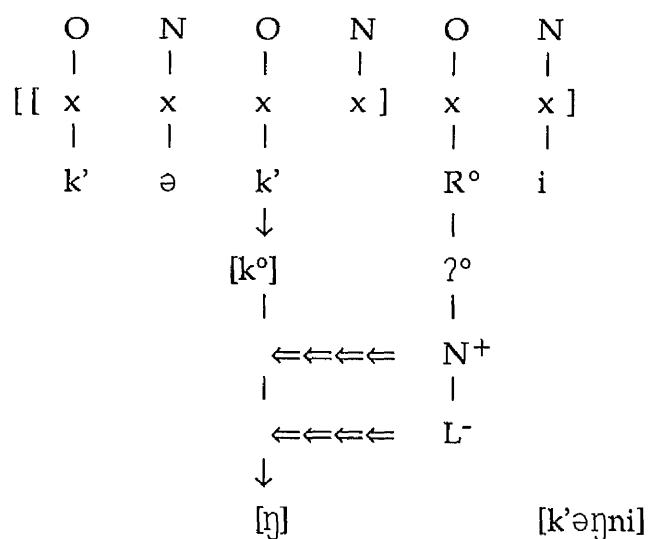
We observe that tensification can apply if the two onsets separated by a domain-final empty nucleus are within a form but does not apply if the two onsets are separated by a word-final empty nucleus¹⁴, i.e. if they are syntactically remote. However, nasalisation does apply in both

¹⁴I use the term 'word-final empty' nucleus referring to the final empty nucleus appearing at the end of word.

contexts. Concretely, the two elements N^+ and L^- in the initial segment of the following word (or suffix) spread to the preceding obstruent whether or not they are syntactically adjacent. Put another way, a nasal always spreads the elements N^+ and L^- to the preceding onset dominating an obstruent, if it appears in the potential governing position across a licensed empty nucleus, i.e. the two elements spread even across a syntactic domain.

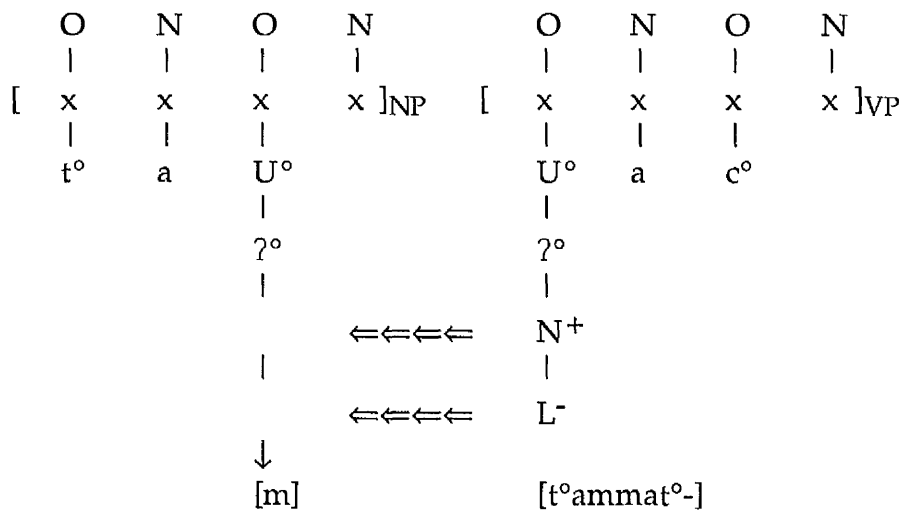
(34) a. N^+ and L^- spread across a domain-final empty nucleus

/[[k'ək'v°] ni]/ [k'əŋni] 'to pick + interrogative'



b. N^+ and L^- spread across a word-final empty nucleus

$t^{\circ}ap^{\circ} \# mac^{\circ}- [t^{\circ}ammat^{\circ}-]$ 'answer + be right'



Returning to the main story, let us consider the case of morphologically simplex (= unsuffixed) cases, in which the empty nucleus appears in a sequence involving a neutral obstruent followed by a nasal (e.g. / $nak^{\circ}v^{\circ}ne/$ [$nak^{\circ}ine$] 'passenger'). As for this case, it may be possible to claim that the empty nucleus receives phonetic interpretation in order to block nasal spreading. In other words, the spreading of elements is blocked, so that morphologically simplex words manifest their underlying segments. This is shown in (35) below, where the word / $nak^{\circ}v^{\circ}ne/$ [$nak^{\circ}ine$] 'passenger' is taken as an example.

(35) nasal spreading is blocked in morphologically simplex words:

/nak^ov^one/ [nak^oine] 'passenger'

O	N	O	N	O	N
x	x	x	x	x	x
n	a	k ^o	[i]	R ^o	e
			// ⇐ N+		
			// ⇐ L-		

4.4.2.4 Empty nuclei before a negatively charmed segment

Finally, I consider a properly governable empty nucleus before negatively charmed segments. Again, I do not include the cases where fricatives and negatively charmed segments are in the preceding onset position. Some examples are given below in (36).

(36) a. liquid + v^o + negative segment + V

/k ^o u:rv ^o t'uk ^o v ^o /	[k ^o u:lt'uk ^o]	'chimney'
/k'arv ^o t'æk ^o i/	[k'alt'æk ^o i]	'funnel'
/marv ^o s'əŋv ^o /	[mals'əŋ]	'trouble'
/p ^o ərv ^o s'ə/	[p ^o əls'ə]	'already'
/s ^o ərv ^o ch ⁱ /	[s ^o əlch ⁱ]	'to run wild'
/k ^o arv ^o k ^h wi/	[k ^o alk ^h wi]	'rake'
/p ^o arv ^o k'v ^o nv ^o /	[p ^o alk'in]	'suddenly'
/marv ^o k'v ^o mv ^o /	[malk'im]	'be clean'

b. nasal + v° + negative segment + V

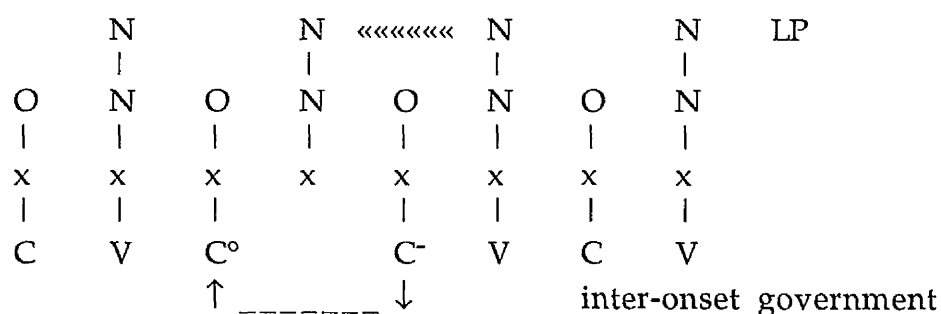
/t°o:ŋv°chimi/	[t°o:ŋchimi]	'pickled cabbage'
/mæ:ŋv°k'oni/	[mæ:ŋk'oni]	'fool'
/k°ə:m v°chi/	[k°ə:mchi]	'to attach'
/ə:m v°pho/	[ə:mp°ho]	'threat'
/p°ənv°c'ək°v°/	[p°ənc'ək°]	'sparkling'
/o:nv°thoŋv°/	[o:nt°hoŋ]	'whole'

c. neutral stop + v° + negative segment + V

/s°æ:k°v°s'i/	[s°æ:k°s'i]	'girl'
/ak°v°chak°v°/	[ak°chak°]	'toughness'
/k°ap°v°c'ak°/	[k°ap°c'ak°i]	'suddenly'
/nv°k°v°t'æ/	[nɪk°t'æ]	'wolf'
/c°ap°v°chi/	[c°ap°chi]	'to spoil'
/k°ak°v°t'uk°i/	[k°ak°t'uk°i]	'raddish'

These examples confirm that a properly governable empty nucleus is not phonetically realised if the consonants surrounding it form an inter-onset governing domain, in other words, if an empty nucleus is followed by a negatively charmed segment and is preceded by a neutrally charmed segment. Therefore, we can formulate a structure for the above data as below in (37).

(37) empty nuclei before a negatively charmed segment



We have so far seen that the licensing of domain-internal empty nuclei of Korean is systematically determined by the quality of the

surrounding consonants. In sum, a properly governable empty nucleus is licensed (realised as [ø]) through proper government if inter-onset government is established between the surrounding consonants, but if the two consonants do not form a governing domain, proper government fails to apply, and the nucleus is phonetically realised.

Chapter Five

GOVERNMENT-LICENSING IN KOREAN AND UNLICENSED FINAL EMPTY NUCLEI

5.1 Introduction

In Chapters 3 & 4, we saw that domain-final empty nuclei in Korean are licensed. In accordance with this fact, we also saw that they have restricted licensing ability for the preceding onset. That is, certain elements in the preceding onset are not licensed by a domain-final empty nucleus. In this chapter, I extend the above discussion to apparent consonant clusters before a domain-final empty nucleus.

Korean has words which manifest apparent consonant clusters (I call them 'double consonants') in domain-final position. Both consonants are pronounced when vowel-initial suffixes are added (e.g. [a:lmi] 'knowledge + nominative suf.'), but a consonant is lost when no suffix follows (e.g. [a:m] 'knowledge'), or when certain consonant-initial suffixes are added ([a:mk°wa] 'knowledge + and'). I call this 'double consonant simplification'. What we should be aware of is that the double consonants are always separated by an empty nucleus. It follows from the fact that Korean allows only open syllables, thus any apparent consonant clusters are not genuine. What is interesting is that the intervening empty nucleus is never phonetically interpreted, even though the following nucleus is itself licensed by virtue of its final position.

In order to account for the above phenomena, I adopt the notion of 'government-licensing' (Charette 1990a, 1991a), which was originally proposed to account for the question of whether or not languages allow a (genuine) consonant cluster before a licensed empty nucleus.

From the following discussion (cf. 5.2&5.3), it will be revealed that domain-final empty nuclei in Korean do not have government-licensing properties, thus, do not license the governing relation formed by two non-nuclear segments.

Finally, in 5.4, I discuss some words which phonetically manifest domain-final empty nuclei. They superficially present problems for the claim that Korean licenses domain-final empty nuclei.

5.2 Government-licensing

5.2.1 The case of licensed domain-final empty nuclei

The government-licensing principle is proposed by Charette (1990a, 1991a). According to her, the question of whether or not a language allows a consonant cluster before a licensed domain-final empty nucleus is a matter of 'government-licensing', which is defined below:

(1) Government-licensing (Charette 1991b)

For a governing relation to hold between a non-nuclear head α and its complement β , α must be licensed to govern by its nucleus at the licenser projection level.

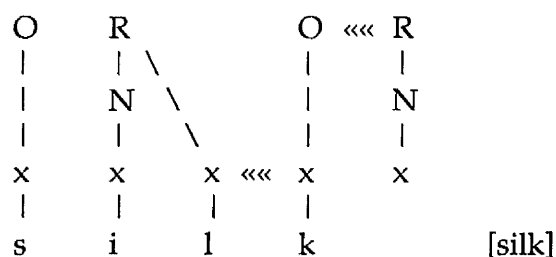
Languages which license domain-final empty nuclei can be largely divided in two groups with respect to whether or not they allow a consonant cluster before a domain-final empty nucleus. In languages like Wolof and Pulaar, for example, words (or domains) may phonetically end with a vowel, a single consonant but never with a consonant cluster. In those languages, a domain-final empty nucleus after a consonant cluster is phonetically interpreted (e.g. Wolof: [dakkə] *[dakk] 'village', Pulaar: [raddu] *[radd] 'to hunt'). In French, English and Polish, on the other hand, words (or domain) may phonetically end with a vowel, a single consonant or a consonant cluster.

According to Charette, the difference between those languages turns on the different government-licensing properties of domain-final empty nuclei. That is, domain-final empty nuclei in French, English, and Polish, which can be preceded by a consonant cluster, have the property of government-licensing. Put it another way, domain-final empty nuclei of those languages are government-licensors, thus, they license the preceding non-nuclear head to govern its complement.

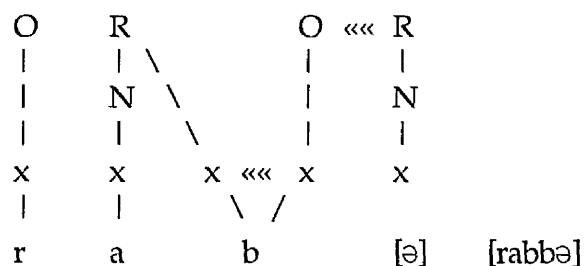
On the other hand, domain-final empty nuclei in Wolof and Pulaar, which allow a single consonant but not a consonant cluster before them, are not government-licensors, thus, do not have government-licensing properties. Unlicensed nuclei are, of course, always government-licensors.

In order to make the difference between the two types more clear, let us compare the behaviour of the domain-final empty nucleus when a consonant cluster precedes. We take the words /silkv°/ [silk] 'silk' from English and /rabbv°/ [rabbə] 'to weave' from Wolof.

(2) a. /silkv°/ 'silk'



b. /rabbv°/ 'to weave'



The two structures in (2) contain an interconstituent governing domain before a domain-final empty nucleus. In order for the non-nuclear head to govern its complement, it must be licensed by the following nucleus that is a government-licenser. As stated above, a licensed domain-final empty nucleus of English is a government-licenser. Thus, it allows the preceding consonantal governing relation formed by the two consonants /l/ and /k/. That is, the domain-final empty nucleus licenses the non-nuclear head /k/ to govern its complement /l/. The fact that French and Polish allow consonant clusters domain-finally can be explained in the same way.¹

¹I recognise that there is a difference between English, and French and Polish. As seen in Chapter 2, while the latter allow a branching onset constituent as well as a branching rhyme followed by a non-branching onset before a domain-final empty nucleus, English does not allow a branching onset in the same position. As for this difference, it is said (Nikiema 1989a, Charette 1991a, 1992) that domain-final empty nuclei of English are direct government-licensors, and in French and Polish domain-final empty nuclei license both directly and indirectly.

In Wolof, on the other hand, word-final empty nuclei are not government-licensors. Thus, the final empty nucleus cannot license the preceding consonantal governing domain. In order for the non-nuclear head to govern the preceding rhymal position, it must be licensed by the nucleus that is a government-licensor. This is the reason why the final empty nucleus in the above structure is phonetically interpreted, i.e. is unlicensed.² Recall that unlicensed nuclei are government-licensors, thus, they license the preceding non-nuclear head to govern its complement.

5.2.2 The case of properly governable domain-internal empty nuclei

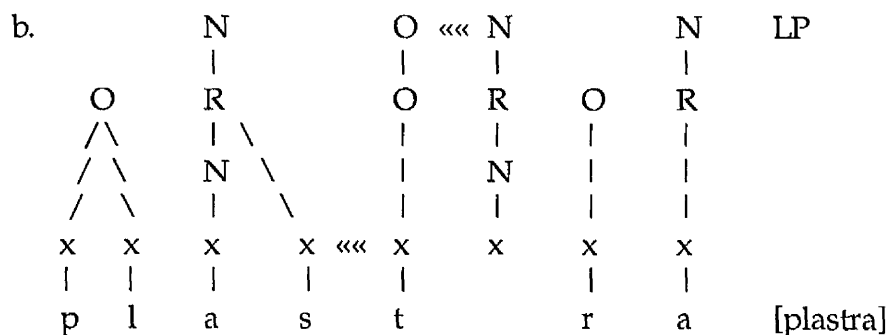
Charette (1992) also discusses the behaviour of domain-internal empty nuclei preceded by a consonant cluster. As expected, languages are largely divided into two groups with respect to whether or not a licensed domain-internal empty nucleus is a government-licensor.

The first case is that of the licensed domain-internal empty nucleus as a government-licensor. Polish manifests this type of nucleus. As can be seen in the following examples, a licensed domain-internal empty nucleus in this language licenses the preceding governing relation formed by two consonants. This yields the form in which three consonants are in sequence phonetically.

²Theoretically, there is another possibility available. That is, the nucleus is remained as being licensed resulting in the impossibility for the non-nuclear head to govern its complement, yielding a consonantal loss. This is observed in domain-internal empty nuclei of the Billiri dialect of Tangale (cf. 5.2.2) and domain-final empty nuclei of Korean (cf. 5.3).

(3) Polish (Charette 1991b)

- a. /plastv^ora/ [plastra] (* [plastera]) 'plaster'
 /ubrv^odac/ [ubrdac] (* [ubredac]) 'imagine'



The second case is that of the licensed domain-internal empty nucleus as a non-government-licenser. French and the Billiri dialect of Tangale belong to this group. Since licensed domain-internal empty nuclei of these languages are not government-licensors, one can reasonably expect certain phonological phenomena to occur either in the nucleus or in the preceding consonant cluster, when the properly governable domain-internal empty nucleus is preceded by a consonant cluster.

In French, proper government fails to apply resulting in an unlicensed domain-internal empty nucleus which can provide a license to a non-nuclear head to govern its complement, as in (4a). Put simply, in order to government-license the preceding non-nuclear head, a properly governable empty nucleus resists being licensed. Thus, it is phonetically interpreted.

In the Billiri dialect of Tangale, on the other hand, the domain-internal empty nucleus is licensed through proper government resulting in the inability of the non-nuclear head to govern its complement. That is, in

this language, one consonant of the cluster is lost (or uninterpreted) in this situation, as in (4b) below.³

(4) a. French (Charette 1991a: 105)

/parvv°nirv°/	[parvənir] (*[parvnir])	'to reach'
/fɔrtv°mã/	[fɔrtəmã] (*[fɔrtmã])	'strongly'

	N		O	N	«« // ««	N		N	LP
O	R		O	R	O	R	O	R	
	\								
|	N \		|	N	|	N	|	N	
	\								
x	x	x	x	x	x	x	x	x	
p	a	r	v	[ə]	n	i	r		
		↑	↓						[parvənir]

b. Billiri (Charette 1991a: 108)

/landa + zi/	[lanzi]	'your (fem.) dress'
/kambo + go/	[kamgo]	'your (masc.) growth'
/simbe + go/	[simgo]	'met'

	N		O	««/««	N	««««««««	N	LP
O	R		O	R	O	R		
	\							
|	N \		|	N	|	N		
	\							
x	x	x	x	x	x	x		
			‡					
l	a	n	d		z	i	[lanzi]	

So far we have seen the government-licensing properties of licensed empty nuclei both in domain-internal and in domain-final position.

³It is claimed by Charette (1991a: 109) that it is the head of the cluster that is not interpreted in the above situation, because it lacks the required properties to govern a complement.

With this mind, let us consider so-called 'double consonant simplification' in Korean.

5.3 Double consonant simplification

5.3.1 Some basic notions

In this section, I discuss the process of so-called 'Double consonant simplification', which refers to the case where one of the double consonants in an apparent domain-final position is not interpreted before a domain-final empty nucleus. In order to account for this process, I adopt the notion of 'government-licensing' discussed above. Some examples are given below in (5).

(5) a. before an unlicensed nucleus

stem	/i/ (nom. suf.)	/A/ (adv. suf.) ⁴
/s°a:rv°mv°/ 'life'	[s°a:lmi]	-
/a:rv°mv°/ 'knowledge'	[a:lmi]	-
/p°urv°k°v°/ 'be red'	-	[p°ulk°ə]
/p°a:rv°p°v°/ 'to step'	-	[p°alp°a]
/murv°k°v°/ 'be thin'	-	[mulk°ə]

⁴Note that the suffixes /i/ and /A/ are nominal and verbal suffixes respectively, thus they are exclusively added to the stem. The same is true in the case of (5b). The verbal suffix /A/ is realised either as [a] or [ə] according to the nature of the stem vowel (cf. S.-J. Chung (1994)).

b. before a licensed a domain-final empty nucleus

stem	# ⁵	/t ^o o/ 'as well'	/c ^o i/ 'interrogative'
/s ^o a:rv ^o mv ^o /	[s ^o a:m]	[s ^o a:mt ^o o]	-
/a:rv ^o mv ^o /	[a:m]	[a:mt ^o o]	-
/p ^o urv ^o k ^o v ^o /	-	-	[p ^o uk ^o c'i] ~ [p ^o ulc'i]
/p ^o a:rv ^o p ^o v ^o /	-	-	[p ^o a:p ^o c'i] ~ [p ^o a:lc'i]
/murv ^o k ^o v ^o /	-	-	[muk ^o c'i] ~ [mulc'i]

The first task in considering the above data is to make sure that the forms contain double consonants in an apparent domain-final position of the stem. This is confirmed by the suffixation shown in (5a). Since the same suffixation to other stems such as /c^oip^ov^o/ 'house' and /c^oap^ov^o/ 'to catch' is realised as [c^oip^oi] 'house + nom. suf.' and [c^oap^oa] 'to catch + adv. suf.' respectively, the nominative and adverbial suffixes must be vowel-initial, and the preceding double consonants in (5a) are part of the lexical representation of the stems. At this stage, it should be recalled that Korean contains only open syllables. Thus, the above clusters are not genuine sequences, but are separated by an intervening empty nucleus.

What is important is that this intervening empty nucleus is not phonetically interpreted, even though it fails to be properly governed by the following licensed domain-final empty nucleus. As for this, I claim that the empty nucleus between the two consonants is the final empty nucleus in its phonological domain. This is confirmed by diachronic and synchronic research. As mentioned in Chapter 2,

⁵Note that, in Korean, nouns can be stems all by themselves, but verbal stems must have at least one suffix.

Korean linguists (e.g. K.-M. Lee 1978) have found that the above words in (5) are morphologically complex, as illustrated in (6) below.⁶

(6) formation of double consonants

/s°a:rv°mv°/ 'life'	⇐	/s°a:rv°/ 'to live'
/a:rv°mv°/ 'knowledge'	⇐	/a:rv°/ 'to know'
/p°urv°k°v°/ 'be red'	⇐	/p°urv°/ 'fire'
/p°a:rv°p°v°/ 'to step'	⇐	/p°a:rv°/ 'foot'
/murv°k°v°/ 'be thin'	⇐	/murv°/ 'water'

Since the words in the left column are derived from the ones in the right, the final consonant must be suffixal. Following Kaye (1993), suffixes are not simply added to the stem. He claims that there are two types of suffixes, namely, analytic and non-analytic. Before continuing the above discussion, let us discuss briefly, in the following section, the distinction between analytic and non-analytic morphology.

5.3.2 Analytic vs. non-analytic morphology

The morphology of suffixation, where two morphemes, say, /A/ and /B/, are added together, manifests two different types of structure, namely, analytic and non-analytic. The difference between the two types is a matter of whether or not the morphology is visible to the phonology. Let us first consider analytic morphology.

⁶However, there are words which are not confirmed as morphologically complex forms. As for these forms, I have no solution at hand, and thus, leave as open question.

5.3.2.1 Analytic morphology

Morphology which carries domains to the phonology will be referred to as analytic morphology. This type of morphology involves internal domains, either as $[[A] [B]]$ or as $[[A] B]$. The brackets ($[\]$) enclose a phonological domain. Thus, the former has three domains, i.e. $[A]$, $[B]$ and $[AB]$, and the latter has two domains, i.e. $[A]$ and $[AB]$. The brackets also represent instructions as to how the phonological string is processed.⁷ Kaye (1993: 102) explains the instructions of the brackets with two functions, namely *concat* and ϕ . The expression *concat* means, "take two arguments which are strings and return the string which results from concatenating the second argument to the first", and the expression $\phi(X)$ means, "apply phonology to the string X.". Following this, the forms $[[A] [B]]$ and $[[A] B]$ are defined as below in (7a) and (7b) respectively.

(7) a. $\phi(\text{concat}(\phi(A), \phi(B)))$

b. $\phi(\text{concat}(\phi(A), B))$

(7a), which is definition of $[[A] [B]]$, is interpreted as "do phonology to A and to B; concatenate the results to form a string (i.e. $[AB]$) and do phonology to that string.". On the other hand, (7b), which is definition of $[[A] B]$, is interpreted as "do phonology to A and concatenate the result with B; do phonology on the result of the concatenation (i.e. $[AB]$).".

Let us consider the two forms in more detail. We take the word *blackboard* as an example of analytic morphology having three

⁷Note that the brackets are not part of phonological representation.

domains (i.e. [[A][B]]), and *peeped* (past tense of *peep*) for the analytic morphology having two domains (i.e. [[A] B]).⁸ Firstly, the word *blackboard* is structured [[blæk[°]v[°]] [bɔ:d[°]v[°]]]. Following the definition in (7a), we first apply phonology to each domain, [blæk[°]v[°]] and [bɔ:d[°]v[°]]: both domains bear stress, and both have empty nuclei, which being domain-final, are phonetically uninterpreted. Then we apply phonology to the concatenated form. We get [blæk[°]bɔ:d], where the first member is the head of the domain and bears primary stress.

The word *peeped*, on the other hand, is structured [[pi:p[°]v[°]]dv[°]]. Following the definition in (7b), we first apply phonology to the domain [pi:p[°]v[°]]: the empty nucleus is licensed by virtue of its final position. We now concatenate [pi:p[°]v[°]] with past tense marker /dv[°]/: [pi:p[°]v[°]dv[°]]. We finally apply phonology to this form: the empty nucleus after /d/, which is domain-final, is licensed. It is therefore inaudible.

So far we have briefly discussed analytic morphology. Let us discuss non-analytic morphology in the following section.

5.3.2.2 Non-analytic morphology

In simple terms, non-analytic morphology is invisible to phonology. Forms having this type of structure are not phonologically parsable, thus, are indistinguishable from single unanalysable words. They have the form [AB]. Thus, in non-analytic morphology, there is only one

⁸In general, English compounds belong to the type of [[A] [B]], and English regular inflectional morphology belongs to the type of [[A] B].

phonological domain, and no inner phonological domains are involved. It follows from this that forms having this type of structure contain only one domain-final empty nucleus. The definition of the form [AB] is given below in (8), which means "concatenate the two strings, A and B, and perform phonology on the result".

$$(8) \quad \phi(\text{concat}(A,B))$$

The English morphology *-al* (as in *parental*), for instance, manifests this type of structure. We first concatenate *parent* and *al*, and then apply phonology to the result. We get *păréntăĭl*, where the primary stress falls on the second syllable. Comparing this with *părěnthòod* (cf. [[parent]hood]), both of which are related to the word *părěnt*, we see that the latter preserves the pronunciation of *părěnt*, but the former does not.

So far we have seen the outline of analytic and non-analytic morphology. In applying the above discussion to Korean, it can be said that the suffixes that trigger the neutralisation of a stem-final obstruent are analytic, because analytic suffixation contains a domain-final empty nucleus in the first cycle, and neutralisation of *obstruents* applies only before a domain-final empty nucleus. The analyticity of other suffixes is somewhat complicated to determine, so these will be considered only when they become relevant to my discussion.

5.3.3 Analysis

Let us return to the main story. The data in (6) below is repeated in (9).

(9) formation of double consonants

/s°a:rv°mv°/ 'life'	⇐	/s°a:rv°/ 'to live'
/a:rv°mv°/ 'knowledge'	⇐	/a:rv°/ 'to know'
/p°urv°k°v°/ 'be red'	⇐	/p°urv°/ 'fire'
/p°a:rv°p°v°/ 'to step'	⇐	/p°a:rv°/ 'foot'
/murv°k°v°/ 'be thin'	⇐	/murv°/ 'water'

In 5.3.1, we saw that the final consonant in the left column must be suffixal. I claim that the suffixes are analytic, i.e. they form a separate phonological domain from the stem. This follows from the fact that the penultimate empty nucleus is always licensed (i.e. [s°almi] 'life (nominative)', and [s°a:m] 'life'). If the forms in the left column were non-analytic, the penultimate empty nucleus would have to be unlicensed, as in the morphologically simplex word /k°urv°mv°/ [k°urim] 'cloud'. Therefore, the so-called double consonants are separated by a domain-final empty nucleus, as the structure in (10) shows, in which the word /[[p°urv°] k°v°]/ 'be red' is taken as an example.

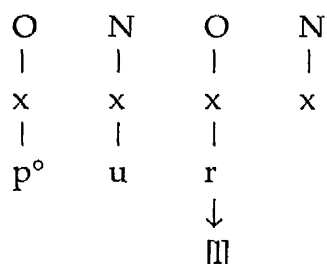
(10) /[[p°urv°] k°v°]/ 'be red'

O	N	O	N	O	N
[x	x	x	x]	x	x]
p°	u	r		k°	

This structure contains two different domains: [p°urv°] and [p°urv°k°v°]. Each domain contains a domain-final empty nucleus which is licensed. Therefore, the final empty nucleus of the first

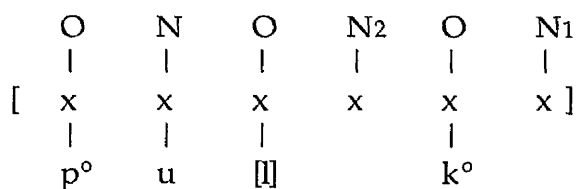
domain is not phonetically interpreted. The preceding segment /r/ alternates with [l] before a licensed empty nucleus, as discussed in Chapter 2. This is shown in (11) below.

(11) [p^ourv^o]



Let us now consider the second domain: [p^ourv^ok^ov^o]. The empty nucleus after /k^o/ is not phonetically interpreted either, because it is also a domain-final empty nucleus. We thus obtain the following structure.

(12) /[[p^ourv^o]k^ov^o]/ 'be red'



This situation causes a problem. The domain-final empty nucleus N₁ is preceded by a governing domain established between two consonants across an empty nucleus N₂, which remains licensed by the Strict Cyclicity Constraint (Kean 1974).⁹ Recall that a licensed empty nucleus allows the two consonants surrounding it to form an inter-onset governing domain, and inter-onset government also applies across a

⁹There are languages in which licensing of empty nuclei may not obey the Strict Cyclicity Constraint (cf. Gussman & Kaye (1993)).

domain-final empty nucleus (cf. Chapter Four).¹⁰ The difference between the the two kinds is as follows: if the empty nucleus is domain-internal, it may or may not be phonetically realised according to proper government and inter-onset government, whereas a domain-final empty nucleus would not be phonetically interpreted, throughout derivations. Let us discuss this in more detail with the following structures in (13), where the empty nucleus in question is emboldened.

(13) a. unanalysable words or non-analytic morphology

O	N	O	N	O	N
x	x	x	x	x	x
C	V	C		C	

b. analytic morphology

O	N	O	N	O	N
[x	x	x	x]	x	x]
C	V	C		C	

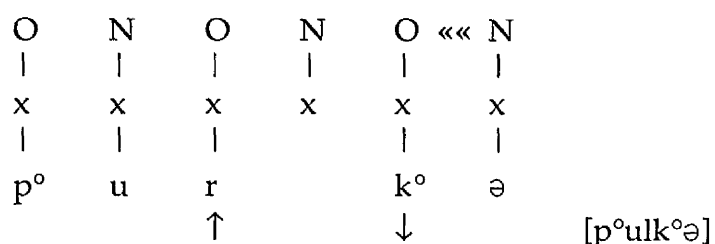
In (13a), where no other phonological domain exists except the word domain, the penultimate empty nucleus is domain-internal. Thus, it is subject to proper government. Since the following nucleus is itself licensed by virtue of its final position, the penultimate nuclear position cannot be properly governed. It is therefore phonetically interpreted. However, the situation is different in (13b). This structure contains two different phonological domains: [CVCv°] and [CVCv°Cv°]. Notice that each domain has a domain-final empty nucleus. Since both empty

¹⁰A clear example can be found in tensification: /mos°v°/ 'pond' + /k°a/ 'side' --> [mot°k'a]. Notice that /k°/ is tensified in order to govern the preceding consonant.

nuclei are domain-final, they are always licensed, and are never subject to proper government. That is, the empty nucleus of the second domain is not a proper governor for the preceding empty nucleus that is the domain-final empty nucleus of the first domain.

Returning to the main story, the fact that both consonants are interpreted when they are followed by an unlicensed nucleus (cf. [p°ulk°ə] 'be red + adverbial suffix') means that a governing relation formed between the two consonants is licensed by the following nucleus dominating the vowel /ə/. Concretely, the non-nuclear governing head /k°/ is government-licensed by this unlicensed nucleus to govern the preceding onset consonant /r/. Therefore, both consonants are interpreted. This is illustrated below in (14).

(14) /p°urv°k° + A/ [p°ulk°ə] 'be red + adverbial suffix'



On the other hand, the fact that one of the two consonants is not interpreted before a domain-final empty nucleus shows that Korean behaves like the Billiri dialect of Tangale. That is, the governing relation formed between the two consonants is not licensed by the domain-final empty nucleus. It follows from this discussion that domain-final empty nuclei in Korean are not government-licensors. What happens is that because the non-nuclear head is not government-licensed by the licensed domain-final empty nucleus, the governing relation formed by the two consonants cannot be sustained, as in (15) below.

(15) /p^ourv^ok^ov^o/ 'be red'

O	N	O	N	O «/«	N
[x	x	x	x	x	x]
p ^o	u	r		k ^o	
		↑	— // —	↓	

What is required in this situation is to block the governing relation formed between the two onsets. One way of doing this is by interpreting the intervening empty nucleus, as we have seen in the case of domain-internal empty nuclei in Chapter 4. However, as mentioned above, the empty nucleus between the double consonants is a domain-final empty nucleus which is always licensed. Therefore, the only way to block inter-onset government is by losing (or 'uninterpreting') one consonant of the two. We get either [p^oul] or [p^ouk^o].¹¹ This is illustrated below in (16).

(16) /[[p^ourv^o]k^ov^o]/ [p^ourk^o] or [p^oul] 'be red'

O	N	O	N	or	O	N	O	N
x	x	x	x		x	x	x	x
p ^o	u	k ^o			p ^o	u	r	
			[p ^o uk ^o]					[p ^o ul]

In this section, we have discussed the so-called double consonant simplification, with respect to the principle of government-licensing. As stated above, this principle was originally proposed in order to account for the behaviour of the empty nucleus preceding a *genuine* consonant cluster. However, we have observed that 'government-licensing' can also account for the consonantal loss in Korean, where

¹¹I am not ready to answer the question of why some words allow two different forms, whereas some other words are pronounced with only a single form.

the sequence of the two consonants is separated by a licensed empty nucleus.

A word should be said on the quality of the double consonants, because one may wonder if there are any cases in which the preceding (i.e. stem-final) consonant is not governed by the following (i.e. suffixal) consonant. If there were such cases, inter-onset government between the two onsets would fail to operate, thus, the above account could not be correct. What is observed is that there are no such cases, as can be seen in (5).

Throughout the above discussion, we have seen that double consonant simplification results from the fact that domain-final empty nuclei of Korean are not government-licensors. This predicts that Korean never allow the forms which phonetically manifest a consonant cluster in domain-final position. Indeed, there are no such words in Korean.

5.4 Unlicensed domain-final empty nuclei

In this section, I discuss some domain-final empty nuclei in Korean, which appear to be phonetically realised. This is a disparate phenomenon in Korean, which generally licenses domain-final empty nuclei. We will discuss two different types of words: mono-syllabic and poly-syllabic. Let us first consider the latter type of word. What is interesting is that the stem-final consonant of these words is either /p'/ or /p^h/. Some examples are given in (17) below, which manifest domain-final empty nuclear positions that are supposedly licensed in this language.

(17) stem	stem + /k ^o / 'and'	gloss
/k ^o ip ^v /	[k ^o i(p ^o)p ⁱ k ^o] ¹²	'be happy'
/k ^o ap ^v /	[k ^o a(p ^o)p ⁱ k ^o]	'be hard'
/p ^o ap ^v /	[p ^o a(p ^o)p ⁱ k ^o]	'be busy'
/mip ^v /	[mi(p ^o)p ⁱ k ^o]	'be trustful'
/ap ^h v ^o /	[a(p ^o)p ^h i k ^o]	'be sick'
/k ^o op ^h v ^o /	[k ^o o(p ^o)p ^h i k ^o]	'be hungry'
/s ^o v ^o rp ^h v ^o /	[s ^o ilp ^h i k ^o]	'be sad'

As can be observed, the stem-final empty nuclei of the above words are phonetically interpreted before certain suffixes such as /k^o/ 'and'. What is interesting is that the suffix /k^o/ 'and' does not trigger [i]-realisation of an empty nucleus in other cases. For instance, the form /k'ək^v/ + /k^o/ 'to pick + and' is realised as [k'ək^ok'ə] (*[k'əkⁱk'ə]). Notice that, in [k'ək^ok'ə], the stem-final empty nucleus is not phonetically interpreted, and the stem-final consonant /k'/ undergoes neutralisation. Therefore, a question arises: what makes the stem-final empty nucleus of the words in (17) unlicensed?

What is crucial in accounting for these words is the fact that they are adjectives derived from verbs. Since they are derived adjectives, they are morphologically complex (cf. K. -M. Lee 1978). The morphology of the above words is shown in (18b). The adjectival suffix /p^ov^o/ is added to verbal stems.

(18) a.	k ^o irip ^o k ^o	<--	[[[k ^o v ^o ri] p ^o v ^o] k ^o]
	'be loved'		
	nollap ^o k ^o	<--	[[[norv ^o ra] p ^o v ^o] k ^o]
	'be surprised'		
	mip ^o k ^o	<--	[[[mi] p ^o v ^o] k ^o]
	'be hateful'		

¹²Note that (p^o) is optionally pronounced.

b.	k ^o i(p ^o)p ^h ik ^o o	<--	[[[k ^o is ^o v ^o] p ^o v ^o] k ^o o]
	k ^o a(p ^o)p ^h ik ^o o	<--	[[[k ^o as ^o v ^o] p ^o v ^o] k ^o o]
	p ^o a(p ^o)p ^h ik ^o o	<--	[[[p ^o ap ^o v ^o] p ^o v ^o] k ^o o]
	mi(p ^o)p ^h ik ^o o	<--	[[[mit ^o v ^o] p ^o v ^o] k ^o o]
	a(p ^o)p ^h ik ^o o	<--	[[[arv ^o hv ^o] p ^o v ^o] k ^o o]
	k ^o o(p ^o)p ^h ik ^o o	<--	[[[k ^o orv ^o hv ^o] p ^o v ^o] k ^o o]
	s ^o ilp ^h ik ^o o	<--	[[[s ^o v ^o rv ^o hv ^o] p ^o v ^o] k ^o o] ¹³

As can be seen above, the suffix is realised in two different ways. When stems end with a lexically filled nucleus (e.g. /k^ov^ori/ 'to love'), the empty nucleus of the suffix /p^ov^o/ is inaudible and the suffixal consonant /p^o/ is sustained as a neutrally charmed segment (cf. 18a). If stems end with an empty nucleus (e.g. /k^ois^ov^o/ 'happy'), the empty nucleus of the suffix /p^ov^o/ is phonetically manifested with the vowel [i]. (cf. 18b). The examples in (18b) also involve the process of tensification of the suffixal consonant (/p^o/ --> [p^h]) or aspiration (/p^o/ --> [p^h]).¹⁴ With this in mind, let us now consider the following structure in (19), where the word [k^oi(p^o)p^hik^oo] 'be happy + and' is taken as an example.

(19) /[[[k^ois^ov^o]p^ov^o]k^oo]/ 'be happy'

	O	N	O	N	O	N	O	N
[[[	x	x	x	x]	x	x]	x	x]
	k ^o	i	s ^o		p ^o		k ^o	o

I would like to claim that the suffixes of this word are analytic, i.e. they form separate phonological domains from the stem. Thus, the above

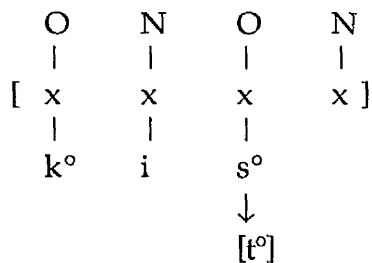
¹³While /r/ in the stem of this word is retained in the derived adjective form (i.e. [s^oilp^hik^oo], /r/ is not interpreted in the forms of [a(p^o)p^hik^oo] 'be sick' and [k^oo(p^o)p^hik^oo] 'be hungry'. As for the difference between the two forms, I am not ready to answer.

¹⁴In Korean, neutral obstruents are realised as aspirated segments when they are adjacent to /h/, and /h/ is not interpreted at all. See Rhee (in preparation) for a detailed discussion.

structure contains three phonological domains: the stem by itself, the stem plus adjectival suffix, and the whole word. Phonological phenomena apply domain by domain.

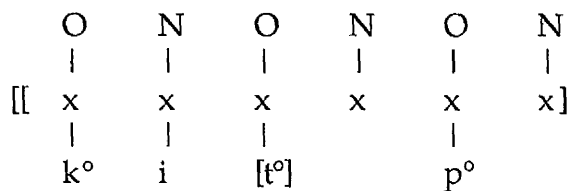
In the first domain, the domain-final empty nucleus is licensed. This domain-final empty nucleus cannot license the preceding onset that contains the fricative /s[°]/. Thus, final obstruent neutralisation applies to the onset in question, yielding [t[°]]. This is shown below in (20).

(20) [k[°]is[°]v[°]]



Let us now consider the second domain: [k[°]is[°]v[°]p[°]v[°]].

(21) [k[°]is[°]v[°]p[°]v[°]]



We are now in the domain which involves the stem and the adjectival suffix. We should remember that the empty nucleus between [t[°]] and /p[°]/ is licensed, and this empty nucleus is not subject to proper government. In this situation, inter-onset government should apply across the licensed empty nucleus.

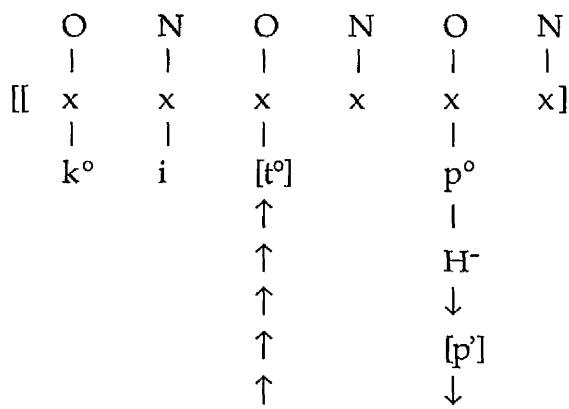
Up to this point, the derivation of the above words is exactly the same as for the case of double consonants. What is different between the two

cases is the quality of the consonants that form the governing domain. In the case of double consonants, the preceding onset can be governed by the following one (cf. /p^ourv^ok^ov^o/). However, the situation is different in the examples in (21). The preceding onset dominating a neutral obstruent cannot be governed by the following one dominating another neutral obstruent /p^o/. If the empty nucleus between the two onsets is domain-internal, we expect phonetic realisation in this position, as in /mos^ov^op^ov^o/ [mos^oip^o] 'figure' or /mæt^ov^op^ov^o/ [mæt^oip^o] 'knot', because the potential proper governor is licensed by virtue of its final position. However, the empty nucleus between /s^o/ (or [t^o]) and /p^o/ in (21) is a final empty nucleus in the first domain. Once it is licensed, it is always licensed throughout the derivation. Thus, it is not expected to receive phonetic interpretation.

We are in the situation in which the following onset, which dominates /p^o/, should govern the preceding onset, which contains [t^o]. Only a negatively charmed segment can govern the neutral obstruent. It is for this reason that the consonant of the adjectival suffix becomes negatively charmed. Korean contains only two types of negatively charmed segments: they are either aspirated or tensed.

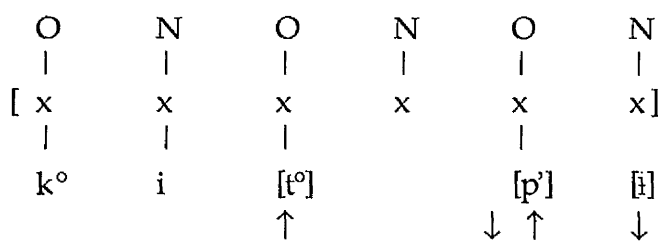
What is observed in Korean is that aspiration takes place only when /h/ is adjacent. In all other cases, neutrally charmed obstruents alternate with their tensed counterpart. This means that Korean takes H⁻ as an ambient element to establish inter-onset government. We thus add the element H⁻ to /p^o/ in the governor position. This is shown below in (22).

(22) / $[k^{\circ}is^{\circ}v^{\circ}p^{\circ}v^{\circ}]$ /



Let us now consider the empty nucleus of the adjectival suffix / $p^{\circ}v^{\circ}$ /. Since this empty nucleus is domain-final, it is licensed. Recall that a (licensed) empty nucleus neither licenses a negatively charmed segment $[p']$ before it, nor licenses the preceding governing relation formed by the two consonants. In this situation, keeping the empty nucleus as licensed will break the preceding governing relation. This could entail the loss of the suffixal consonant, because licensed empty nuclei will not license a negatively charmed segment. If this is the case, the result is no different from the form which consists of a stem only. Thus, the governing relation between the two onsets must be maintained. In order to do so, the final onset containing $[p']$ must be licensed by the following nucleus. How can it be licensed? We see that there is only one way to do it. That is, we have to unlicense the empty nucleus, as shown in (23) below.

(23) / $[k^{\circ}is^{\circ}v^{\circ}]p^{\circ}v^{\circ}$ /



Let us now consider the process of the alternation in the stem-final consonant. What we need to assume is that the consonant in the governed position assimilates to the governing consonant.¹⁵ In fact, this is a very common phenomenon in Korean. Some examples are given in (24) below.

(24) a. verbs

stem	/A/ 'adverbial'	/k°o/ 'and'	
/k°ət°v°/	[k°ət°-ə]	[k°ək°-k'o]	'to collect'
/u:s°v°/	[u:s°-ə]	[u:k°-k'o]	'to laugh'
/ip°v°/	[ip°-ə]	[ik°-k'o]	'to wear'
/s°umv°/	[s°um-ə]	[s°uŋ-k'o]	'to hide'

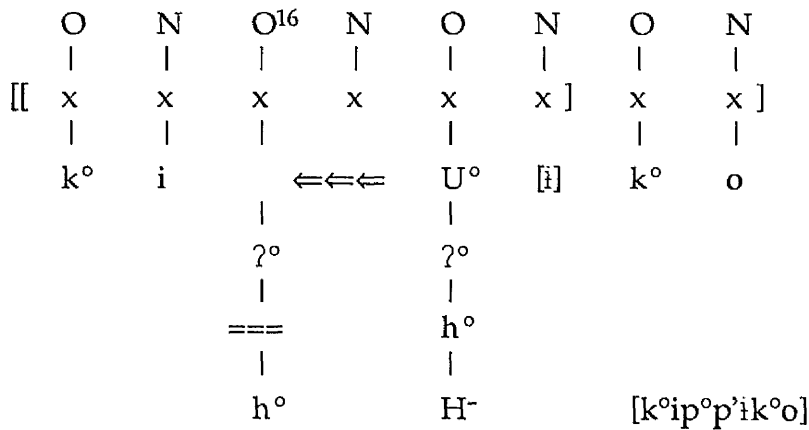
b. nouns

stem	/e/ 'at'	/p°ot°a/ 'rather than'	
/s°ot°hv°/	[s°ot°h-e]	[s°op°p°ot°a]	'cooker'
/os°v°/	[os°-e]	[op°p°ot°a]	'clothes'
/s°inv°/	[s°in-e]	[s°imp°ot°a]	'shoe'

Based on the above data, it is now possible to claim that the element R° in /t°/ is delinked from the position and the U° in /p°/ spreads to it. We thus finally derive [k°ip°p°ik°o] after adding the suffix /k°o/ 'and'. This is shown in (25) below.

¹⁵Since the governed position immediately precedes a licensed empty nucleus, the consonant is realised as [p°] rather than [p']. Recall that negatively charmed segments cannot appear before a licensed empty nucleus.

(25) /[[k°is°v°p°v°]k°o]/



We have so far discussed the first instance of unlicensed domain-final empty nuclei. Let us now move on to the mono-syllabic words, shown in (26) below.

(26)	/k°v°/	[k°i]	'he'	/k°hv°/	[k°hi]	'be big'
	/k°v°/	[k°i]	'to put out'	/t°hv°/	[t°hi]	'to sprout'
	/t°v°/	[t°i]	'to rise'	/s°v°/	[s°i]	'to write'

These words invariably pronounce the nucleus and the following two reasons account for it. Firstly, they are domain-initial. Since domain-initial empty nuclei of Korean are inaccessible to phonological processes, they must be unlicensed. The second reason comes from the fact that the above words are mono-syllabic. That is, they contain only two phonological positions: the onset and the nucleus. The nucleus is the only nucleus in the domain, and it must be the head of the phonological domain of each word because it licenses the onset. Recall the licensing principle which states that a phonological domain must have one unlicensed position. Therefore, the nucleus cannot be licensed, thus, it is phonetically interpreted. This is illustrated below in (27).

¹⁶Since this onset is followed by a licensed empty nucleus, the element h° will be deleted (or uninterpreted).

(27) /k^ov^o/ [k^oi] 'he'

O	N
x	x
k ^o	[k ^o i]

So far we have discussed domain-final empty nuclei of Korean, and some phonological phenomena related to them. It has been argued that (a) domain-final empty nuclei of Korean are licensed, (b) they may license the preceding onset, with certain restrictions (cf. neutralisation), and (c) they do not have the property of government-licensing; thus, the governing relation formed by two preceding consonants cannot be licensed (cf. double consonant simplification).

In the following chapter, I discuss [i]-zero alternation in suffixation.

Chapter Six

[i]-ZERO ALTERNATION IN SUFFIXATION

6.1 Introduction

Up to this point, we have seen that the vowel [i] in Korean does not randomly occur in single words. This vowel is an instance of the phonetic manifestation of an empty nucleus, and the interpretation of it is controlled by the constraint of proper government. In this chapter, we discuss [i]-zero alternation in nominal and verbal suffixations.

As shall be seen throughout the discussion, my account of this process is different from previous approaches (e.g. W.-C. Kim 1972; Kim-Renaud 1974, 1982, 1986; Ahn 1985; Sohn 1987 among others) which consider the process as either [i]-insertion or [i]-deletion.

As seen in the previous chapter, the morphology of suffixation is either analytically or non-analytically manifested (cf. Kaye 1993). That is, morphological structures may or may not be visible to the phonology according to the analyticity of the suffix. In accounting for [i]-zero alternation in nominal and verbal suffixations using this notion, we face several problems. That is, these suffixations are not fully accounted for by the present theory, and we thus leave the problems as open question. Let us first consider the [i]-zero alternation in nominal suffixation.

6.2 Nominal suffixation

6.2.1 The data

In this section, let us first consider [i]-zero alternation in inflectional morphology of nouns. At first glance, it does not seem to be complicated at all, because it behaves exactly the same as in morphologically simplex words. Consider the examples in (1) below. We note that there are only three suffixes that permit the realisation of an empty nucleus between the stem and suffix: /nv°/ (topicalising suffix), /rv°/ (objective suffix) and /ro/ 'to, with'.¹ We also note that no (nominal or verbal) suffix begins with a negatively charmed segment.

(1) [i]-zero alternation in nominal suffixations

a. suffix: /nv°/ (topicalising suffix), /rv°/ (objective suffix)

k°uk°	[k°uk°in]	[k°uk°il]	'soup'
p°ak'	[p°ak'in]	[p°ak'il]	'outside'
c°ip°	[c°ip°in]	[c°ip°il]	'house'
ip ^h	[ip ^h in]	[ip ^h il]	'leaf'
p°ath	[p°athin]	[p°athil]	'field'
os°	[os°in]	[os°il]	'clothes'
p°ic°	[p°ic°in]	[p°ic°il]	'debt'
k'och	[k'ochin]	[k'ochil]	'flower'
nun	[nunin]	[nunil]	'eye'
s°o:m	[s°o:min]	[s°o:mi]	'cotton'
k°oŋ	[k°oŋin]	[k°oŋil]	'ball'
mur	[murin]	[muril]	'water'

¹The question why only these three suffixes manifest phonetic interpretation of an empty nucleus relates with their morphological structures (see below).

namu	[namun] (*[namuin])	[namul] ² (*[namuil])	'tree'
t°ari	[t°arin] (*[t°ariin])	[t°aril] (*[t°ariil])	'leg'

b. suffix: /ro/ 'to, with'

k°uk°	[k°uk°iro]	'soup'
p°ak'	[p°ak'iro]	'outside'
c°ip°	[c°ip°iro]	'house'
ip ^h	[ip ^h iro]	'leaf'
p°ath	[p°athiro]	'field'
os°	[os°iro]	'clothes'
p°ic°	[p°ic°iro]	'debt'
k'oc ^h	[k'oc ^h iro]	'flower'
nun	[nuniro]	'eye'
s°o:m	[s°o:miro]	'cotton'
k°oŋ	[k°oŋiro]	'ball'
mur	[mullo] (*[muriro])	'water'
namu	[namuro] (*[namuiro])	'tree'
t°ari	[t°ariro] (*[t°ariiro])	'leg'

From the above data, we see that the empty nucleus between the stem and suffix is always phonetically interpreted except in two cases. The vowel [i] is not audible between the stem and suffix (i) when the stem ends in an unlicensed nucleus (e.g. [namuro] 'tree + to, with'), and (ii) when the stem ends in a liquid and the suffixal nucleus is unlicensed (e.g. [mullo] 'water + to, with').

I now summarise the facts of [i]-zero alternation in nominal suffixation in (1) as in (2) below.

²In the case of vowel-final stems, the suffixes [n] and [l] are optionally realised as [nin] and [ril] respectively (e.g. [namun] or [namunin], and [namul] or [namuril]). We will discuss this case in 6.2.7.

- (2) context of [i]-zero alternation in nominal suffixation:
 C1 (v°) C2, where C1 is the stem-final consonant and C2 is
 the suffix-initial consonant.

C1	C2	nasal	liquid	
		Cv° (/nv°/)	Cv° (/rv°/)	CV (/ro/)
obstruent		i	i	i
nasal		i	i	i
liquid		i	i	ø
vowel		ø	ø	ø

6.2.2 The morphological structure of nominal suffixation

The first task in an explanation of [i]-zero alternations in nominal suffixation would be to find out the correct representations of the suffixes and their morphological properties, i.e. whether they are analytic or not.

As for the representation of the nominal suffixes above, there are the following two possibilities. In (3a) the suffix begins with a non-empty onset, and the suffix begins with an empty nucleus in (3b)³.

- (3) representations of the nominal suffixes

a.	O	N	b.	O	N	O	N
	x	x			x	x	x
	α	β				α	β

³In fact, the structure in (3b) begins with an empty onset. However, in order to distinguish this structure from the one which begins with an empty onset dominating a skeletal point but no segment, it is more convenient to say that the structure (3b) begins with an empty nucleus.

The above representations and the preceding stem will accommodate either analytic structure (i. e. $[[A] B]$ or $[[A] [B]]$) or non-analytic structure (i. e. $[AB]$). Two possible representations of the suffix combined with the three types of morphological structures give us six possibilities for the resulting structures. However, it should be noted that non-analytic structures must represent possible lexical forms. Since no lexical representation contains a sequence of adjacent empty nuclei, the following type of structure must be excluded from the set of well-formed structures.

(4)

*	O	N	O	N	O	N	O	N
	x	x	x	x		x	x	x
	C	V	C			C	V/v°	

The remaining five structures are given in (5) below, where the stem $/k^{\circ}uk^{\circ}v^{\circ}/$ 'soup' and the suffix $/ro/$ 'to, with' are taken as examples.

(5) **non-analytic morphology**

a.

O	N	O	N	O	N
x	x	x	x	x	x
k°	u	k°		r	o

analytic morphology with two domains

b.

O	N	O	N	O	N
[[x	x	x	x]	x	x]
k°	u	k°		r	o

c.	O	N	O	N	O	N	O	N	
	[[x	x	x	x]		x	x	x]
		k ^o	u	k ^o			r	o	

analytic morphology with three domains

d.	O	N	O	N	O	N	
	[[x	x	x	x] [x	x]]
	k ^o	u	k ^o		r	o	

e.	O	N	O	N	O	N	O	N	
	[[x	x	x	x] [x	x	x]]
		k ^o	u	k ^o			r	o	

Since nominal suffixation manifests [i]-zero alternation between stem and suffix, the eligible structures must contain domain-internal empty nuclei, which may or may not be phonetically realised according to the required conditions.

(5a) is the manifestation of a non-analytic structure. Since this structure contains a domain-internal empty nucleus in the penultimate nuclear position, it deserves to be considered.

The structures (5b&c) are the manifestation of analytic structure with two phonological domains. In these structures, the stem itself constitutes a phonological domain, but the suffix does not. In (5b), the suffix begins with an onset dominating /r/. What is observed is that this structure has no domain-internal empty nucleus. The empty nucleus in the first domain is domain-final, and thus is licensed. This

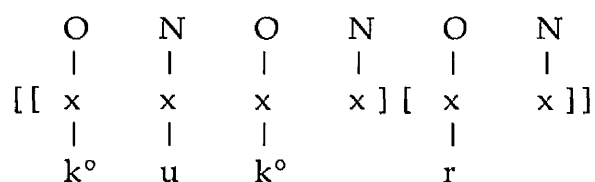
means that no [i]-zero alternation can be observed in this structure, which no longer needs to be considered.⁴

In (5c), on the other hand, the suffix begins with an empty nucleus. The way that this structure is different from (5b) is that the former contains a domain-internal empty nucleus in the penultimate nuclear position. Since domain-internal empty nuclei may or may not be phonetically interpreted according to proper government, this structure is eligible for consideration.

The structures (5d&e) are the manifestation of analytic structure with three phonological domains. In (5d), the suffix begins with an onset dominating /r/. As in (5b), the empty nucleus in this structure is not domain-internal, but is domain-final of the stem, and hence is always licensed in Korean. This means that this structure cannot manifest an [i]-zero alternation, and should be ruled out. Furthermore, this type of structure is ill-formed with respect to general principles of GP. Consider the following structure, where we add the suffix /rv°/ (objective).

⁴I acknowledge that there are cases where the domain-final empty nucleus is phonetically interpreted in languages which license domain-final empty nuclei. The English word *kisses* is one case, in which the final empty nuclear position in the first domain is unlicensed in order to avoid an OCP violation. However, this kind of phenomenon cannot be found in Korean. Recall the cases (e.g. /[p°ap°v°]p°v°/ [p°a(p°)p°i] 'be busy') where the adjective suffix /p°/ is added to the stem (cf. Chapter 5). The outcome of this type of form reveals that they unlicense the domain-final empty nucleus in the second domain rather than the one in the first domain, viz., [p°a(p°)p°i] (*[p°ap°ip°]). It follows from this that Korean may unlicense a domain-final empty nucleus. However, it is not stem-final, but is suffix-final. Thus, in (5b), [i]-zero alternation between stem and suffix cannot be observed in Korean.

(6) /[[k^ouk^ov^o] [rv^o]]/ 'soup (objective)'



Recall the Licensing Principle which implies that a phonological domain must have an unlicensed position, viz., the head. What we see in (6) is that the suffix consisting of a single {O N} pair which itself forms a domain does not obey this principle, because no positions are unlicensed: the onset is licensed by the following nucleus, and the following empty nucleus is also licensed by virtue of its final position.⁵

In (5e), the suffix begins with an empty nucleus. Since this structure contains a domain-internal empty nucleus in the second domain, one might consider it a possible candidate. However, there is one thing we should be aware of. That is, the suffix-initial empty nucleus is domain-initial. Recall that the domain-initial empty nucleus in Korean is not subject to proper government, and never fails to be phonetically interpreted (cf. Chapter 4). Thus, this structure cannot account for the licensing of the empty nucleus when the suffix /ro/ 'to, with' is added to the stem ending with a liquid (e. g. /murv^o/ + /ro/ [mullo] (*[muriro] 'water + to, with'). This structure is then also out of the running.

From the above discussion, we see that only two structures are eligible as representations of the nominal suffixation. That is, the nominal morphology must be either (7a) or (7b).

⁵Or else the structure (6) predicts the pronunciation [ri] which is incorrect.

(7) a. non-analytic morphology

O	N	O	N	O	N
x	x	x	x	x	x
k ^o	u	k ^o		r	o

b. analytic morphology with two domains

O	N	O	N	O	N	O	N
x	x	x	x		x	x	x
k ^o	u	k ^o			r	o	

In the following section, we will consider these two possibilities in turn.

6.2.3 The non-analytic approach

In order to decide between the two possibilities, let us begin the discussion with a re-consideration of the data in (1). In (1) above, the intervening empty nucleus between the two morphemes never fails to be phonetically manifested when either of the suffixes /nv^o/ or /rv^o/, which contain a final empty nucleus, are added to the stem that phonetically ends in a consonant. If the suffix /ro/, which begins with a liquid and is followed by a lexically filled nucleus, is attached, the empty nucleus after the stem ending in a consonant also receives phonetic interpretation, except in /r/-ending stems. I would like to note that the phonetic interpretation of an empty nucleus in nominal

suffixation is no different from that in morphologically simplex words.
Some morphologically simplex examples are given in (8) below.

(8) morphologically simplex words

/jət°v°nv°/ [jət°in]	/ərv°nv°/ [ərin]
'eighty'	'adult'
/onv°rv°/ [onil]	/k°jərv°rv°/ [k°jərɪl]
'today'	'leisure'
/hət°v°re/ [hət°ire]	/mjənv°ri/ [mjəniri]
'trash'	'son's wife'
/k°ə:rv°re/ [k°ə:lle]	/c°irv°ri/ [c°illi]
'dustcloth'	'be fed up'

Thus, the first consideration would be that the nominal suffixes in (1) manifest non-analytic structure, as in (6a), and the [i]-zero alternation can be accounted for by proper government as can be seen in (9) below.

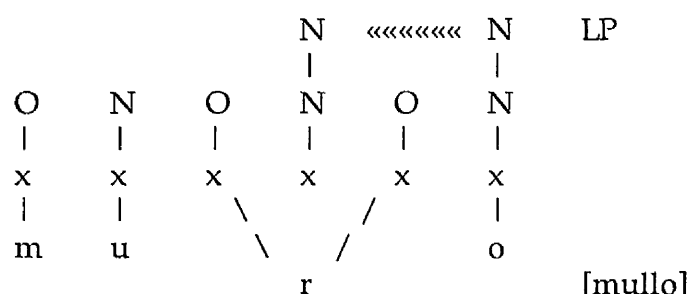
(9) a. [k°uk°il] 'soup (topicalising), [k°uk°in] 'soup (objective)'

			N «« // «« N	LP
O	N	O	N	O
x	x	x	x	x
k°	u	k°		r/n
				[k°uk°il] / [k°uk°in]

b. [k°uk°iro] 'soup + to, with'

			N	««««««	N	LP
O	N	O	N	O	N	
x	x	x	x	x	x	
k°	u	k°		r	o	
		↑	//	↓		[k°uk°iro]

c. [mullo] 'water + to, with'⁶



However, there is a fact which makes such a view dubious. That is, nominal suffixes never trigger [i]-zero alternation in the stem. Consider the following examples, where an empty nucleus is present after /r/ and is followed by a nasal or an obstruent, that is more complex than /r/; we see that our analysis must be flawed.

(10) stem	stem + suffix			
/k°urv°mv°/ 'cloud'	[k°urim]	[k°urimin]	[k°urimil]	[k°urimiro]
/ərv°nv°/ 'adult'	[ərin]	[ərinin]	[ərinil]	[əriniro]
/c°urv°p°v°/ 'agent'	[c°urip°]	[c°urip°in]	[c°urip°il]	[c°urip°iro]
/mirv°k°v°/ 'Buddha'	[mirik°]	[mirik°in]	[mirik°il]	[mirik°iro]

When these words are pronounced without suffixes, the empty nucleus after /r/ is phonetically realised, because the final empty nucleus is licensed because of its domain-final position, and so cannot properly govern this position. They are realised as [k°urim], [ərin], [c°urip°] and [mirik°] respectively. However, the situation should be different when we add a suffix. We expect that the empty nucleus after

⁶It should be noted that, at the time of writing this thesis, Kaye (1993) has claimed that an empty nucleus surrounded by two onsets associated to the same segment, is licensed. Following this, proper government is not required to explain the licensing of the empty nucleus in this structure. However, since this issue is not crucial to our present discussion, I follow the earlier system as in the previous chapters.

/r/ will be licensed, because it is properly governable by the following nucleus: the following onset can govern the preceding one dominating /r/, and the following unlicensed nucleus can be a proper governor. Consider the following morphologically simplex forms given in (11) below.

(11) morphologically simplex words

/t°v°rv°mv°rv°/	[t°ilmil] (*[t°irimil])	'flood'
/marv°mi/	[malmi] (*[marimi])	'leisure'
/s°arv°k°v°mv°/	[s°alk°im] (*[s°arik°im])	'softly'
/nərv°p°v°rəc°i/	[nəlp°irəc°i] (*[nərip°irəc°i])	'to scatter'

We see that in morphologically simplex words, the empty nucleus in this similar context is licensed. However, such [ø]-alternant cannot be observed in the forms in (10). The empty nucleus in the stem always fails to be licensed even though it is properly governable (e.g. /k°urv°mv°rv°/ [k°urimil] 'cloud (objective)').

(12) /k°urv°mv°rv°/ [k°urimil] 'cloud (topicalising)'

			N «« // «« N «« // «« N				LP
O	N	O	N	O	N	O	N
x	x	x	x	x	x	x	x
k°	u	r	[i]	m	[i]	r	
							[k°urimil] (*[k°ulmil])

From the above discussion, we see that the nominal suffixation in (1&10) cannot be non-analytic. We therefore turn to the other possibility (cf. 7b), where the stem and suffix manifest analytic structure.

6.2.4 The analytic approach

In this section, let us consider the structure (7b) where the stem and suffix manifest analytic structure. In this type of structure, the stem itself constitutes a phonological domain, but the suffix does not, as in (13) below. We take the form $/[[k^{\circ}urv^{\circ}mv^{\circ}] v^{\circ}nv^{\circ}]/$ 'cloud (topicalising)' as an example.

(13) $/[[k^{\circ}urv^{\circ}mv^{\circ}] v^{\circ}nv^{\circ}]/ [k^{\circ}urim]$ 'cloud (topicalising)'

	O	N	O	N	O	N	O	N	O	N
[[	x	x	x	x	x	x]		x	x	x]
	k [°]	u	r		m			n		

This structure contains two phonological domains: $[k^{\circ}urv^{\circ}mv^{\circ}]$ and $[k^{\circ}urv^{\circ}m(v^{\circ})v^{\circ}nv^{\circ}]$. The first domain produces $[k^{\circ}urim]$, where the final empty nucleus is licensed by virtue of its final position, and the penultimate empty nucleus that is not properly governed is phonetically interpreted, as in (14) below.

(14) $/[k^{\circ}urv^{\circ}mv^{\circ}]/ [k^{\circ}urim]$

				N	««	//	««	N		LP
	O	N	O	N	O	N				
[	x	x	x	x	x	x]				
	k [°]	u	r	[ɪ]	m					

Let us continue and incorporate the external domain. This is shown in (15) below.

(15) /k^ourv^omv^onv^o/ [k^ourimin] 'cloud (topicalising)'

	O	N	O	N	O	N	O	N	O	N
[	x	x	x	x	x	x		x	x	x]
	k ^o	u	r	[i]	m				n	

This structure contains a sequence of empty nuclei with an intervening empty onset. According to Gussman & Kaye (1993: 433), this type of configuration is the context in which the process of reduction applies.

(16) Reduction (Gussman & Kaye 1993: 433)

An empty nucleus followed by a pointless onset are removed from any phonological representation in which they occur.

Applying this principle to (15), the antepenultimate empty nucleus, which is the final nucleus of the internal domain, and the following empty onset will disappear, as in (17) below.

(17) /k^ourv^omv^onv^o/ [k^ourimin] 'cloud (topicalising)'

	O	N	O	N	O	N	O	N
[	x	x	x	x	x	x	x	x]
	k ^o	u	r	[i]	m		n	

This structure also contains a domain-final empty nucleus. Being domain-final, it is licensed and cannot be a proper governor for the preceding empty nucleus which is suffix-initial. We thus get an unlicensed empty nucleus in the penultimate nuclear position. At this stage, one could argue that the empty nucleus in the antepenultimate position, which is unlicensed in the internal domain, could be properly governed by the following unlicensed nucleus. What is seen from the

outcome of the form [k^ourimin] is that the antepenultimate nuclear position remains unlicensed., i.e. it resists being properly governed by the following unlicensed nucleus.

Following Gussmann & Kaye (1993: 434f.), an empty nucleus like the one in the antepenultimate position in the above structure, which is unlicensed in the internal domain but is properly governable in the external domain, may or may not be licensed according to two conditions: (i) whether or not the licensing of the empty nucleus obeys the Strict Cyclicity Constraint (Kean 1974), and (ii) whether or not unlicensed empty nuclei acquire additional segmental material. Gussmann & Kaye (1993), who discuss the same case in Polish,⁷ claim that this language obeys the Strict Cyclicity Constraint. Thus an unlicensed empty nucleus in the internal domain never be properly governed by a following unlicensed nucleus. For instance, in the form /[[[p^vsv^o]v^okv^o]v^okv^o]/ [pesekek]⁸ 'dog (double dim.)', the embolded empty nuclei are properly governable by the following unlicensed nucleus.⁹ However, the outcome of this form shows that they resist being licensed. This can be explained by the claim that the licensing of the empty nucleus in Polish obeys the Strict Cyclicity Constraint.¹⁰

⁷Note that domain-internal empty nuclei in Polish respect proper government (e.g. /sv^onv^o/ [sen] dream' vs. /sv^onu/ [snu] 'id. (gen. sg)').

⁸Note that the actual pronunciation of this form is [piesʃek]. However, palatalisation has no bearing on the discussion at hand, and I simplified the form as [pesekek].

⁹In this case, the potential proper governor is not a domain-final empty nucleus, but is a suffix-initial empty nucleus. This follows from the fact that domain-final empty nuclei are deleted by the process of reduction.

¹⁰Gussmann & Kaye (1993) provide another reason for the failure of proper government in the Polish case above. That is, unlicensed empty nuclei in Polish are realised as [e]. This means that the underlying empty nucleus acquires additional elements (i.e. I^o and A⁺) in the course of derivation, and so it becomes a non-empty nucleus. Being not empty, this position is not subject to ECP. Note that cases which do not obey the Strict Cyclicity Constraint can be found in Arabic (Kaye 1987, 1990b) or European Portuguese (Cavaco 1993), in which no additional elements are added to the unlicensed empty nucleus.

Returning to the case of Korean, we see that this language obeys the Strict Cyclicity Constraint. That is, the antepenultimate empty nucleus remains unlicensed, because it is unlicensed in the first domain. This is shown in (18) below, resulting in [k^ourimin].

(18) /k^ourv^omv^onv^o/ 'cloud (topicalising)'

			N	««	//	««	N	««	//	««	N	LP
	O	N	O	N	O	N	O	N				
[	x	x	x	x	x	x	x	x			x]
	k ^o	u	r	[i]	m	[i]	n					[k ^o urimin]

We have so far discussed the phonetic realisation of an empty nucleus in nominal suffixations. What is revealed is that nominal suffixes are analytic. However, this claim is still problematic. Consider the data in the following section.

6.2.5 Problems with the analysis in terms of analytic morphology

What we have not yet considered are the forms where the stem-final onset contains a segment which cannot be licensed by a licensed empty nucleus. What we expect is the stem-final consonant to undergo neutralisation, because it is followed by the domain-final empty nucleus. However, this is not the case in nominal suffixation. Observe the following examples.

(19) a. some examples

/murv ^o p ^h v ^o /	[murip ^o]	[murip ^h in]	[murip ^h il]	[murip ^h iro]
'knee'				
/p ^o ərv ^o s ^o v ^o /	[p ^o ərit ^o]	[p ^o əris ^o in]	[p ^o əris ^o il]	[p ^o əris ^o iro]
'habit'				
/k ^o v ^o rv ^o s ^o v ^o /	[k ^o irit ^o]	[k ^o iris ^o in]	[k ^o iris ^o il]	[k ^o iris ^o iro]
'plate'				

b. /murv^op^hv^o/ [murip^o] 'knee'

O	N	O	N	O	N
[x	x	x	x	x	x]
m	u	r		p ^h	

c. /[[murv^op^hv^o] v^onv^o]/ [murip^hin] 'knee (topicalising)'

O	N	O	N	O	N	O	N	O	N
[[x	x	x	x	x	x]		x	x	x]
m	u	r		p ^h				n	

With no suffixes added, the words in (19a) are realised as [murip^o], [p^oərit^o] and [k^oirit^o] respectively. What is important is that the stem-final onset undergoes neutralisation before a domain-final empty nucleus, as shown in (20) below.

(20) /murv^op^hv^o/ [murip^o] 'knee'

			N	«« // ««	N	LP
O	N	O	N	O	N	
x	x	x	x	x	x	
m	u	r	[i]	p ^h		
				↓		
				[p ^o]		

By the same logic, we could expect neutralisation of the stem-final onset in analytic morphology as well, because the internal domain also contains a domain-final empty nucleus, as can be seen in (19c) above. Recall the definition of analytic morphology (cf. Chapter 5) which implies that in a domain, all phonological processes which can apply must apply. Following this, the form $/[[murv^{\circ}p^{hv^{\circ}}]v^{\circ}nv^{\circ}]/$ 'knee (topicalising)' must undergo the following two processes: ECP and the neutralisation of the stem-final obstruent. These yield $*[murip^{\circ}in]$. However, this is not the case. The problem with this form and the others in (19a) is that the stem-final obstruents do not undergo neutralisation, viz. $[murip^{hin}]$ ($*[murip^{\circ}in]$). This contradicts what we expect in analytic morphology, namely that a stem-final obstruent followed by a domain-final empty nucleus should undergo neutralisation.

In fact, there are forms in which the stem-final obstruents do undergo neutralisation. For instance, the forms $/murv^{\circ}p^{hv^{\circ}}/ + /anv^{\circ}/$ 'knee + inside' and $/murv^{\circ}p^{hv^{\circ}}/ + /aræ/$ 'knee + below' are realised respectively as $[murip^{\circ}an]$ and $[murip^{\circ}aræ]$, rather than $*[murip^{han}]$ and $*[murip^{haræ}]$. We see that these two forms are cases of genuine analytic morphology. Comparing the two forms, $[murip^{\circ}an]$ and $[murip^{\circ}aræ]$, it follows that the nominal suffixes which trigger [i]-zero alternation cannot be analytic.

The situation up to this point is that the phonological processes in nominal suffixation can be accounted for neither by non-analytic morphology, because the unlicensed nucleus after the stem cannot properly govern the preceding empty nucleus in the stem, nor by analytic morphology, because stem-final obstruents do not undergo neutralisation before a domain-final empty nucleus.

What is interesting is that German manifests a similar process. Let us consider the German facts by reviewing the proposal of Brockhaus (1992).

6.2.6 The case of German

As is well known, German manifests the process of final obstruent devoicing (henceforth, FOD) before a licensed empty nucleus.¹¹ However, there are words in which an obstruent containing the element L- does not undergo FOD when a vowel-initial analytic suffix is added. For instance, the word *schreiben* /[[*raɪbʏ*°]*ənv*°]/ 'to write'¹² is realised as [*raɪbən*], rather than *[*raɪpən*]. With respect to this phenomenon, she proposes applying the notion of 'autosegmental licensing'.¹³

If FOD is indeed a matter of autosegmental licensing, it can be treated as purely interpretive, since 'autosegmental licensing is distinct from association' (Goldsmith 1989: 149). L- remains present in the representation, although its presence does not manifest itself, neither phonetically nor in terms of segmental complexity or charm. Interpretive phenomena do not involve an actual change to a representation, so analytic vowel-initial suffixes are no longer a problem. (Brockhaus 1992: 207)

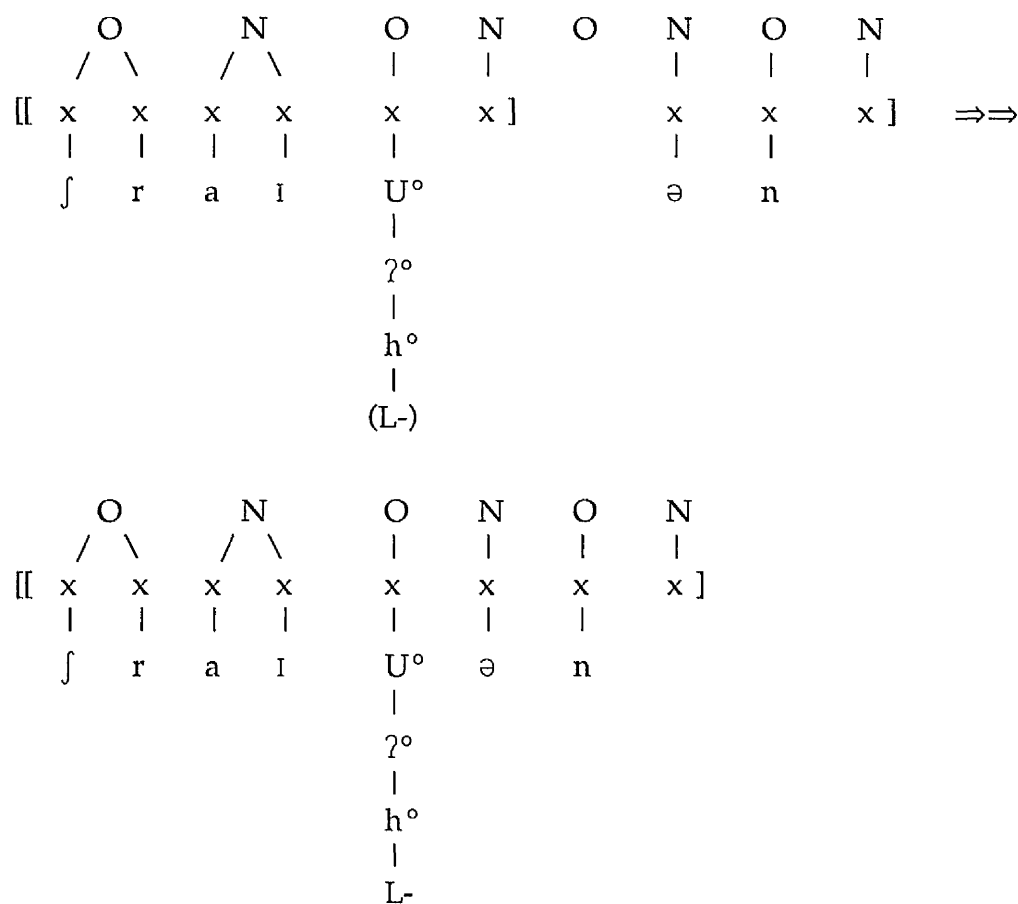
¹¹Following Brockhaus (1992), FOD is the loss of the element L-.

¹²According to Brockhaus (1992: 204), vowel-initial suffixes in German can be classified in two groups. One is stress-neutral, and the other is not. As for this, she claims that the former belongs to the analytic class, and the latter belongs to the non-analytic class. The infinitive suffix /*ənv*°/ is stress-neutral, and is thus analytic.

¹³Autosegmental licensing is the licensing of segmental content.

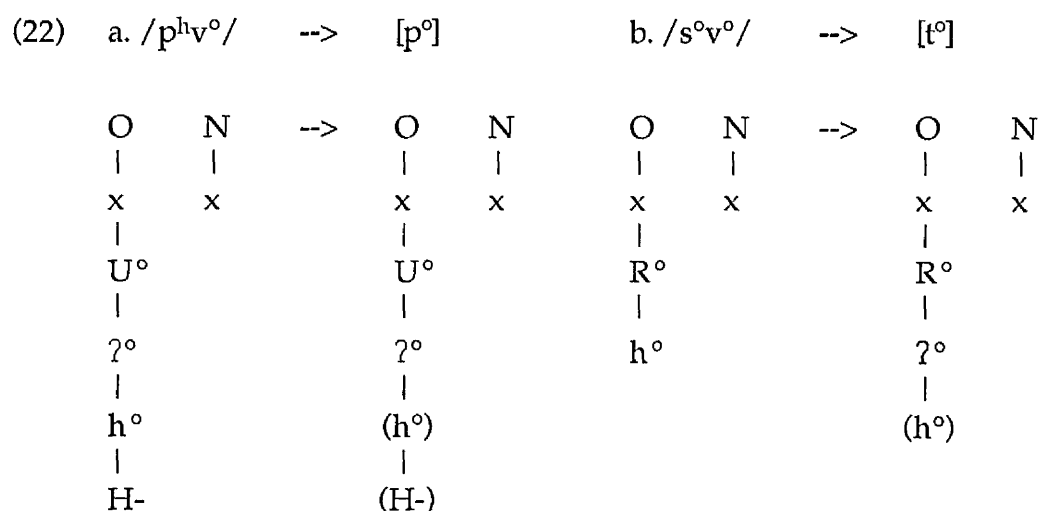
Following this notion, FOD can be seen as the non-interpretation, rather than the deletion of L-. This element is not interpreted in the first domain, when the domain-final nucleus is licensed to be empty, but will then be interpreted when the suffix-initial nucleus becomes the new licenser by the deletion of the final empty nucleus by OCP. This is shown in (21) below, where an element which is present, but not licensed, is shown in brackets.

(21) /[[frai**bv**^o]ənv^o]/ [frai**b**ən] 'to write'



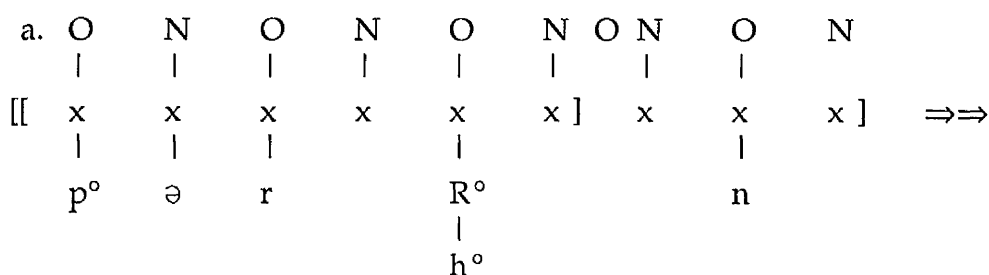
The claim made by Brockhaus seems quite reasonable, so that we can account for a negatively charmed segment, say, /p^h/ being fully realised as such when a vowel-initial analytic suffix is added.

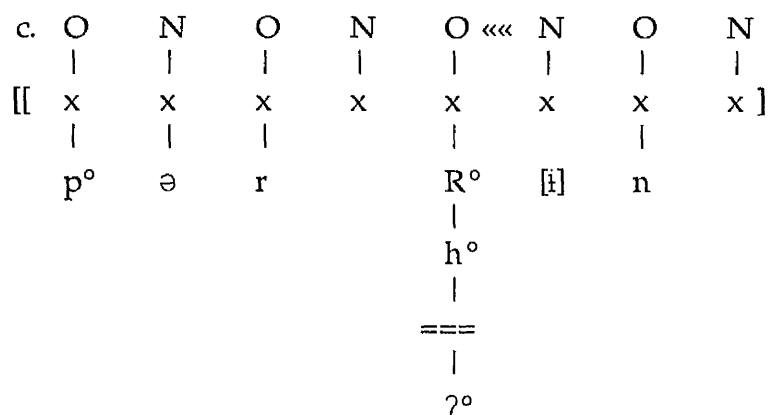
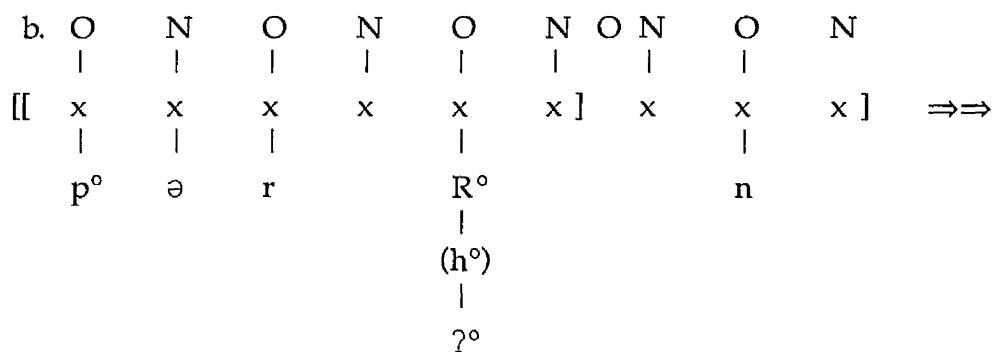
However, such an analysis still poses some problems. Firstly, Brockhaus' analysis cannot account for the case of Korean, where stems contain a fricative in their final onset position (e.g. /p°ərv°s°v°/ 'habit' (cf. 19)). The difference between fricatives, and aspirated or tensed segments is that when neutralisation applies, the latter loses an element, whereas the former *gains* the element ʔ° (e.g. /p°ərv°s°v°/ [p°ərit°]).



However, when the suffixes which manifest [i]-zero alternation or those beginning with an unlicensed nucleus such as /i/ (nominative suffix) are added to these stems, the final consonants do not undergo neutralisation, i.e. [p°əris°in] and [p°əris°i]). If we follow Brockhaus' claim, we have to say that the element ʔ° is added in the first cycle, and must then be deleted in the next cycle.

(23) /[[p°ərv°s°v°] v°nv°]/ 'habit (topicalising)'





The problem with the above derivation lies in the fact that ʔ^o undergoes deletion (cf. 23c). The question is why ʔ^o has to undergo deletion in this form. Notice that other segments, say /t^o/ (as in /nat^ov^o/ 'grain') do not lose the element ʔ^o before the same suffix (e.g. [nat^oin] 'grain (topicalising)'). We simply do not know which ʔ^o can undergo deletion, and which cannot.

The second problem comes from the fact that the stem-final onset /p^h/ in /murv^op^hv^o/ does undergo neutralisation when the suffix /anv^o/ 'inside' is added: [murip^oan] (*[murip^han]). In 6.3.2.3.1, we saw that this form is analytic, where the suffix begins with an unlicensed empty nucleus. If the the initial unlicensed nucleus of the analytic suffix eventually licenses the final onset in the preceding domain, as

Brockhaus claimed, we should not expect neutralisation in the form [murip^oan] either.¹⁴

From the above discussion, we see that nominal suffixation in Korean cannot be fully accounted for by the morphological structure proposed by Kaye (1993), thus, the theory requires extending to a certain degree. However, in the following pages, I only try to minimise the problems that are raised in the discussion above.

6.2.7 The analysis

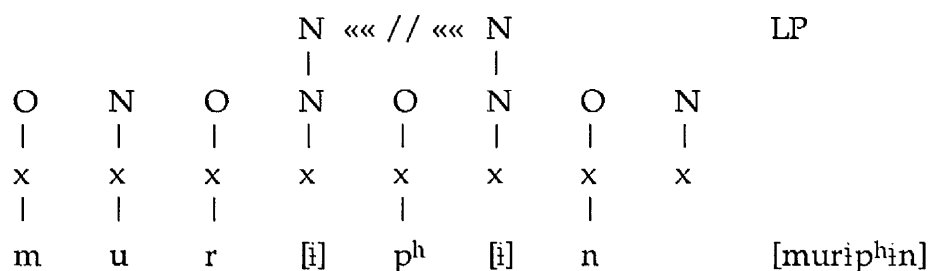
If morphology interacts with the phonology only in two ways, either analytically or non-analytically, the nominal suffixes that permit [i]-zero alternation would have to be non-analytic. This follows from the fact that, as seen in the previous section, there is no way in the current conception of analytic morphology to account for the fact that stem-final obstruents do not undergo neutralisation without violating the projection principle.¹⁵ On the other hand, in non-analytic morphology, there may be scope for saying that the domain-internal empty nucleus fails to be licensed in suffixed forms. Consider the form [murip^hin] 'knee (topicalising)', in which the topicalising suffix /nv^o/ is added to the stem /murv^op^hv^o/ 'knee'. I would like to claim that the suffix of this form is non-analytic.

¹⁴What is interesting is that German does not manifest compounds where the second term begins with a vowel. According to Brockhaus (1992: 210), in this language, there is a general constraint which prevents empty onsets from forming the left-most position in an independent domain. The onset has to be filled by a suitable consonant or, in the absence of such a segment, by glottal stop (e.g. *farb-echt* [faʁpʔɛçt] 'colour-fast').

¹⁵Projection Principle (KLV 1990: 221)

Governing relations are defined at the level lexical representation and remain constant throughout a phonological derivation

(24) /murv°p^hv°nv°/ [murip^hin]



What we see in (24) is that the empty nucleus in the stem resists being properly governed by the suffixal vowel. This observation turns out to be true in all nominal suffixation: no empty nucleus originating in the stem is properly governed by an unlicensed nucleus originating in the suffix (e.g. [k°urimi] 'cloud (nominative)' and [p°əris°il] 'habit (objective)'). As to the question why this is so, I have no clear answer at hand. I thus leave it as an open question. A putative claim that, in Korean, proper government applies only within a morphological domain cannot be maintained, because it contradicts the definition that a word formed by non-analytic morphology is itself a single domain. There is no inner domain in non-analytic morphology.

We may find one possible answer to the above question from the Southern dialect. Consider the following examples.

- (25) a. /p°ərv°s°v°nv°/ [p°əris°in] 'habit (topicalising)'
 (*[p°əls°in])
 /k°v°rv°s°v°rv°/ [k°iris°il] 'dish (objective)'
 (*[k°ils°il])
 /irv°mv°ro/ [irimiro] 'name + with'
 (*[ilmiro])

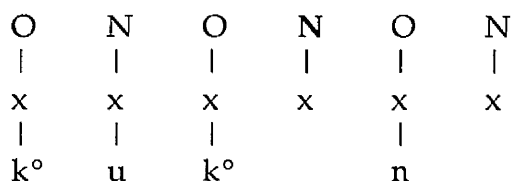
b.	/p ^o ərv ^o s ^o i/	[p ^o əls ^o i]	'habit (nominative)'
		(~[p ^o əris ^o i])	
	/k ^o v ^o rv ^o s ^o e/	[k ^o ils ^o e]	'dish + at'
		(~[k ^o iris ^o e])	
	/irv ^o mi/	[ilmi]	'name (nominative)'
		(~[irimi])	

The above examples show that the empty nucleus in the stem can be licensed if the nucleus in the suffix is lexically filled (cf. 25b), and it fails to be licensed if the nucleus in the suffix is underlyingly empty (cf. 25a). From this, one might propose that the empty nucleus in the suffix may not have the power to properly govern the empty nucleus in the stem. However, since there are dialects in which proper government fails to apply even if the suffixal nucleus is lexically filled, we need further research on this issue.

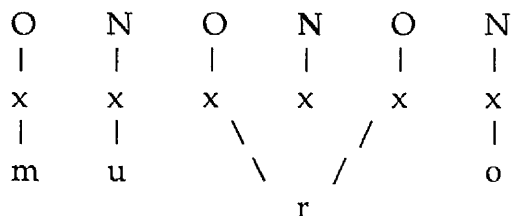
A word should be said about the consequence of non-analytic nominal morphology. We observe that, unlike other languages such as Arabic (Kaye 1990b), there is no stem alternation in nominal morphology. It follows from this that the inflectional morphology of Korean does not allow variation in the licensing within a stem. At this stage, it is worth noting that nominal stems can appear in an utterance without suffixes. In other words, nouns can be stems all by themselves. Thus, if a stem has an unlicensed empty nucleus (as in /irv^omv^o/ [irim] 'name'), this position is always unlicensed in all suffixations (e.g. /irv^omv^orv^o/ [irimil] 'name (objective)').

Let us now return to the issue of [i]-zero alternation in the stem and suffix. Consider the following structures in (26) below. Recall the claim that nominal suffixes which permit [i]-zero alternation are non-analytic. The empty nucleus in question is printed in bold.

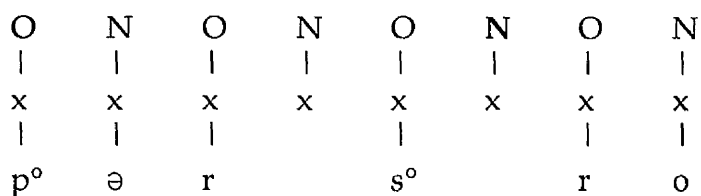
(26) a. /k^ouk^ov^onv^o/ [k^ouk^oin] 'soup (topicalising)'



b. /murv^oro/ [mullo] 'water + to, with'



c. /p^oərv^os^ov^oro/ [p^oəris^oiro] 'habit + with'



In (26a), the final empty nucleus is licensed by virtue of its final position. This licensed empty nucleus cannot be a proper governor for the preceding empty nucleus. Thus, the empty nucleus in the penultimate position is phonetically interpreted: [k^ouk^oin]. The structure (26b), on the other hand, contains only one empty nucleus in the penultimate nuclear position. Since this empty nucleus can be properly governed by the following nucleus, it will be licensed. Recall that the liquid associated to two onsets is realised as [ll].¹⁶ We thus obtain [mullo].

The structure (26c) contains two empty nuclei. The penultimate empty nucleus fails to be licensed. The failure of inter-onset government

¹⁶See Chapter 4 for a detailed discussion.

blocks proper government from applying: /r/ cannot govern /s°./. Therefore, the penultimate empty nucleus is phonetically interpreted. What about the empty nucleus in the antepenultimate nuclear position? This empty nucleus is unlicensed. As seen above, in Korean, it appears that the empty nucleus in the stem resists being properly governed by the (empty) nucleus in the suffix. This is shown in (27) below.

(27) /p°ərv°s°v°ro/ [p°əris°iro] 'habit + with'

			N	«« // ««	N	«« // ««	N
O	N	O	N	O	N	O	N
x	x	x	x	x	x	x	x
p°	ə	r	[i]	s°	[i]	r	o
				↑ __ // __ ↓			[p°əris°iro]

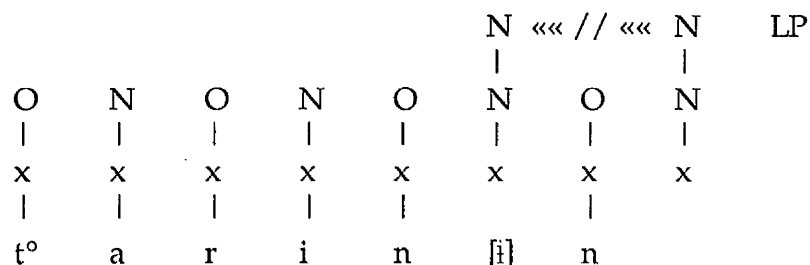
Let us now consider the case where the stem ends in an unlicensed nucleus and the final nucleus in the suffix is licensed. In this case, as mentioned earlier, we can have two types of forms (e.g. [t°arin] ~ [t°arinin] and [t°aril] ~ [t°ariril]). Let us first consider the former type. Since the stem ends in a filled nucleus, no empty nucleus will be visible between the stem and suffix (cf. Empty Syllable Constraint, Gussmann & Kaye 1993). The structure of [t°arin] is given in (28) below. We see that the result follows in a straightforward way.

(28) /t°arinv°/ [t°arin] 'leg (topicalising)'

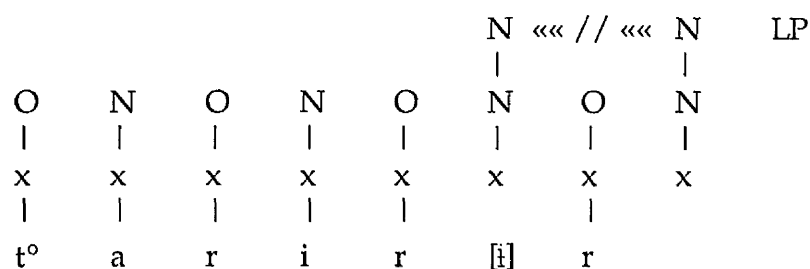
O	N	O	N	O	N
x	x	x	x	x	x
t°	a	r	i	n	

Let us now consider the forms of [t°arinin] and [t°ariril]. As for these forms, we would like to claim that double morphology is involved: /t°ari + n + v°nv°/ and /t°ari + r + v°rv°/. This is shown in (29) below.

(29) a. [t°arinin] 'leg (topicalising)'



b. [t°ariril] 'leg (objective)'



The above structures both contain two empty nuclei. The final empty nucleus is licensed by virtue of its final position. This licensed empty nucleus cannot be a proper governor for the preceding empty nucleus. Therefore, the penultimate empty nucleus is not licensed, and consequently, receives phonetic interpretation. We obtain the correct forms: [t°arinin] and [t°ariril].

So far we have discussed [i]-zero alternation in nominal suffixation in Korean. In the following section we will discuss the case of verbal suffixation.

6.3 Verbal suffixation

6.3.1 The data

The process of [i]-zero alternation in the inflectional morphology of verbs is somewhat different from that in morphologically simplex words. As we shall see below, the nasal-final and liquid-final stems are the cases which behave differently.

The suffixes which trigger [i]-zero alternation include /s^oi/ 'honorific suffix'; /p^v°/ 'polite suffix'; /mjə/ 'and'; /mv°/ 'gerundive suffix'; /rə/ 'in order to' and /rv°/ 'future tense'. These suffixes can be divided into two types according to whether or not the nucleus is lexically filled: /s^oi/, /mjə/ and /rə/ on the one hand, /rv°/, /mv°/ and /p^v°/ on the other hand. Let us first consider the former type.

(30) when the nucleus of the suffix is unlicensed

a. suffix: /s^oi/ (honorific)

mak ^o	[mak ^o is ^o i]	'to block'
c ^o ap ^o	[c ^o ap ^o is ^o i]	'to catch'
p ^o at ^o	[p ^o at ^o is ^o i]	'to receive'
p ^o ic ^o	[p ^o ic ^o is ^o i]	'to make'
k'ak'	[k'ak'is ^o i]	'to cut'
is'	[is'is ^o i]	'to be'
c'och	[c'ochis ^o i]	'to chase'
nə:m	[nəmis ^o i] ¹⁷ (*[nə:mzi])	'to go over'
s ^o in	[s ^o inis ^o i] (*[s ^o inzi])	'to wear'

¹⁷Note that stem vowels undergo shortening if the following nucleus is unlicensed. I do not explore this issue in this thesis. See Rhee (in preparation) for a detailed discussion.

amur	[amus ^o i] ¹⁸ (~[amuris ^o i])	'to recover'
p ^h ur	[p ^h us ^o i] (~[p ^h uris ^o i])	'to solve'
k ^o a	[k ^o as ^o i] (*[k ^o ais ^o i])	'to go'
c ^o u	[c ^o us ^o i] (*[c ^o uis ^o i])	'to give'

b. suffix: /mjə/ 'and'

mak ^o	[mak ^o imjə]	'to block'
u:s ^o	[us ^o imjə]	'to laugh'
nak'	[nak'imjə]	'to fish'
p ^o æth	[p ^o æthimjə]	'to spit'
k ^o a:m	[k ^o amimjə] (*[k ^o ammjə])	'to roll'
s ^o in	[s ^o inimjə] (*[s ^o inmjə])	'to wear'
s ^o a:r	[s ^o a:lmjə] (~[s ^o arimjə])	'to live'
p ^h ur	[p ^h ulmjə] (~[p ^h urimjə])	'to solve'
k ^o a	[k ^o amjə] (*[k ^o a'imjə])	'to go'
c ^o u	[c ^o umjə] (*[c ^o uimjə])	'to give'

c. suffix: /rə/ 'in order to'

mak ^o	[mak ^o irə]	'to block'
c'ic ^o	[c'ic ^o irə]	'to tear'
t ^o ak'	[t ^o ak'irə]	'to clean'
t ^o əph	[t ^o əphirə]	'to cover'
t ^o a:m	[t ^o amirə]	'to fill'
s ^o in	[s ^o inirə]	'to wear'
p ^h ur	[p ^h ullə] (~[p ^h urirə])	'to solve'
k ^o ə:r	[k ^o ə:llə] (~[k ^o ərirə])	'to hang'
k ^o a	[k ^o arə] (*[k ^o airə])	'to go'
c ^o u	[c ^o urə] (*[c ^o uirə])	'to give'

As can be seen above, the empty nucleus after a stem-final obstruent is always unlicensed. This is exactly the same as in the case of morphologically simplex (i.e. unsuffixed) words. Since no suffixes

¹⁸As mentioned in chapter One, an independent process triggers the loss of /r/ before /s^o/ and /n/. I cannot find any other suffix that begins with an obstruent followed by an unlicensed nucleus.

begin with a negatively charmed segment, the sequence [C°v°C°] cannot be found in verbal inflectional morphology.

The first problem that concerns us is that the empty nucleus is phonetically interpreted between nasals (cf. /s°in + mjə/ 'to wear and' --> [s°inimjə] (*[s°inmjə])), and in sequences involving a nasal followed by a neutral obstruent (cf. /s°in + s°i/ 'to wear (honorific)' --> [s°inis°i] (*[s°inzi])). Recall that the empty nucleus in the same contexts is always licensed in morphologically simplex words (cf. /k°umv°nir/ [kumnɪl] 'to stretch' and /t°əmv°p°i/ [t°əmbi] 'to attack').¹⁹

The fact that /r/-final stems allow two different pronunciations is another point that needs discussion. In such cases, the empty nucleus after stem-final /r/ may or may not be licensed. (cf. /p°hur + mjə/ 'to solve and' --> [p°hulmjə] ~ [p°hurimjə]). In morphologically simplex words, the empty nucleus in the same context never fails to be licensed, as in /t°arv°k°u/ [t°alk°u] 'to heat' and /jərv°mæ/ [jəlmæ] 'fruit'. In other words, [riCV] never occurs in morphologically simplex forms.

Finally, in the case of vowel-final stems, the vowel [i] is not audible between the stem and suffix.

Let us now consider the data in which the nucleus of the suffix is underlyingly empty. Recall that, in morphologically simplex words, the penultimate empty nucleus is always unlicensed if the final nucleus is licensed (e.g. /narv°nv°/ [narɪn] 'be dull').

¹⁹In order to be sure that these examples are morphologically simplex words, it should be noted that the vowel /A/, which is realised either as [a] or [ə], is always inserted between two stems in verbal compounds: e.g. /c°hamv°/ 'to endure' + /næ/ 'to do (something) all the way' --> [c°hamanæ] 'to endure to the end', /p°at°v°/ 'to receive' + /nəmv°k°i/ 'to pass' --> [p°at°anəmgɪ] 'to receive and pass', and /t°o:rv°/ 'to turn' + /p°o/ 'to look' --> [t°orap°o] 'to look back' etc. This means that, in verbs, a consonantal cluster surrounding an empty nucleus is not derived from compounding. In fact, [NiNV] can only be found in verbal inflectional morphology.

(31) when the nucleus of the suffix is licensed

	/rv°/ (future)	/mv°/ (gerundive)	/p°v°/ (polite)	
mək°	[mæk°il]	[mæk°im]	[mæk°ip°]	'to eat'
c'ic°	[c'ic°il]	[c'ic°im]	[c'ic°ip°]	'to tear'
t°ak'	[t°ak'°il]	[t°ak'°im]	[t°ak'°ip°]	'to clean'
t°əp ^h	[t°əp ^h il]	[t°əp ^h im]	[t°əp ^h ip°]	'to cover'
t°a:m	[t°amil]	[t°amim]	[t°amip°]	'to fill'
s°in	[s°inil]	[s°inim]	[s°inip°]	'to wear'
p ^h ur	[p ^h ul] (~[p ^h uril])	[p ^h um] (~[p ^h urim])	[p ^h up°] (~[p ^h urip°])	'to solve'
k°ə:r	[k°ə:l] (~[k°əril])	[k°ə:m] (~[k°ərim])	[k°ə:p°] (~[k°ərip°])	'to hang'
k°a	[k°al]	[k°am]	[k°ap°]	'to go'
c°u	[c°ul]	[c°um]	[c°up°]	'to give'

From the above examples, we can observe that, apart from /r/-ending stems and vowel-final stems, the empty nucleus between stem and suffix is never licensed, as we expect.

In the case of /r/-final stems, we can have two forms: one is the form in which the empty nucleus in question is phonetically interpreted (e.g. /p^hurv°mv°/ [p^hurim] 'solving'). This is exactly the same as the case of morphologically simplex words (e.g. /curv°mv°/ [curim] 'wrinkles'). In the other form, the stem-final /r/ is deleted, and the following empty nucleus is licensed (e.g. /p^hurv°mv°/ [p^hum] 'solving'). Since this kind of process cannot be found in morphologically simplex words, this is the case we need to discuss.

In the case of vowel-final stems, the vowel [i] is inaudible between the stem and suffix, as in (30), where the suffixal nucleus is unlicensed.

I now summarise the facts in (30&31) as below in (32), where D²⁰ represents deletion of /r/.²¹

(32) context of [i]-zero alternation in verbal suffixation: C1 (v°)
C2, where C1 is the stem-final consonant and C2 is the
suffix-initial consonant.

C2	obstruent		nasal		liquid	
	CV (/s°i/)	Cv° (/p°v°/)	CV (/mjə/)	Cv° (/mv°/)	CV (/rə/)	Cv° (/rv°/)
obstr.	i	i	i	i	i	i
nasal	i	i	i	i	i	i
liquid	i or ø	i or ø & D	i or ø	i or ø & D	i or ø	i or ø & D
vowel	ø	ø	ø	ø	ø	ø

In order to understand the exact nature of verbal suffixation, let us repeat the cases which behave in a different way from morphologically simplex words.

²⁰I do not include /r/-deletion before /s°/ (and /n/), because it is a matter of segmental structure that Korean does not allow such (pseudo-)sequences. Apart from this case, /r/-deletion applies when the suffix contains a licensed empty nucleus.

²¹I note that there are verbal stems (but not nominal stems) ending in /h/. When the suffixes in (29&30) are added, the behaviour of these stems is very similar to /r/-ending stems. That is, they produce two different forms (cf. 6.3.2.3.3). Nevertheless, I do not include these forms in the following table, because the behaviour of /h/ is not fully understood. Domain-finally, this segment behaves in a different way from other segments when suffixes other than (30&31) are added. For instance, stem-final /h/ triggers aspiration of the suffix-initial neutral obstruent in the following onset position. In this case, the stem-final /h/ itself is not audible: e.g. /nohv°/ + /k°o/ [nok^ho] 'to put + and'. Domain-internally, on the other hand, there is no way of knowing the behaviour of an empty nucleus after /h/, simply because there are no eligible simplex words. For this reason, I use /h/-ending verbal stems only for supporting evidence.

(33) An empty nucleus is unlicensed even though properly governable in the following environment:

- a. between nasals (e.g. [s^oinimjə] 'to wear + and')
- b. between a nasal and a neutral obstruent²² (e.g. [s^oinis^oi] 'to wear (honorific)')
- c. after a liquid (e.g. [p^huris^oi] 'to solve (honorific)')

6.3.2 The analysis

6.3.2.1 The morphological structure of verbal suffixation

In order to understand the behaviour of the empty nucleus between the verbal stem and suffix, we must first find out the morphological properties of the suffixes, i.e. decide on the analyticity of the suffixes and their representations.

As for the representation of the suffixes themselves, we have two possibilities: either they begin with an onset dominating the first consonant of the suffix, or they begin with an empty nucleus. In the latter case, the first consonant of the suffix associates with the second onset of the suffix. This is shown in (34), where the suffix /s^oi/ (respective) is taken as an example.

(34)	a.	O	N	b.	O	N	O	N
		x	x		x	x	x	x
		s ^o	i			s ^o	i	i

²²In this case, the neutral obstruent involves /s^o/ only, as we have seen in (30).

Let us now consider the analyticity of the verbal suffixes that permit [i]-zero alternation. Unlike the nominal cases, no verbal stems contain a sequence of empty nuclei in the penultimate and final positions (i.e. $*/CVCv^{\circ}Cv^{\circ}/$). Thus, we cannot test whether or not the empty nucleus in the stem can be properly governed by the suffixal vowel. Consequently, we have only one criterion, namely the neutralisation of a stem final obstruent, to determine the analyticity of the verbal suffixes. Recall that neutralisation applies only if the following empty nucleus is licensed.

Let us consider the following examples which are taken from (30) above.

(35)	/s ^o i/ (respective)	/ni/ 'because'
nak'	[nak'is ^o i] (*[nak ^o s ^o i])	[nak'ini] (*[nak ^o ni])
'to fish'		
t ^o əp ^h	[t ^o əp ^h is ^o i] (*[t ^o əp ^o s ^o i])	[t ^o əp ^h ini] (*[t ^o əp ^o ni])
'to cover'		
c ^o ic ^o	[c ^o ic ^o is ^o i] (*[c ^o it ^o s ^o i])	[c ^o ic ^o ini] (*[c ^o it ^o ni])
'to bark'		

From the above examples, we see that the suffixes cannot be analytic. If they are analytic, the stem itself forms a domain, as can be seen in (36) below.

(36) /[[nak'v^o]s^oi]/ 'to fish (respective)'

O	N	O	N	O	N
[[x	x	x	x]	x	x]
n	a	k'		s ^o	i

In (36), the stem-final onset is followed by a domain-final empty nucleus which is always licensed. This licensed empty nucleus will

trigger neutralisation of the preceding obstruent (i.e. *[nak^o]). However, as can be seen in (35) above, this is not the case. The fact that the stem-final obstruent does not undergo neutralisation means that the empty nucleus following the stem-final onset has always been unlicensed. Thus, we can reasonably claim that verbal inflectional morphology as in (30&31) manifests non-analytic structure. This is shown in (37) below, where the empty nucleus in question is emboldened.

(37) verbal inflectional morphology

O	N	O	N	O	N
x	x	x	x	x	x
C	V	C		C	V/v ^o

Let us now discuss the behaviour of the empty nucleus between the verbal stem and the suffix. Let us start the discussion by considering some simple cases in which the empty nucleus behaves in the same way as that of morphologically simplex forms.

6.3.2.2 Some simple cases

Firstly, I consider the stems ending in an obstruent. As we have seen in (30&31) above, the empty nucleus after an obstruent invariably fails to be licensed. This is exactly the same as the case of morphologically simplex forms. For clarity I show some examples of verbal morphology below in (38a), and also give some examples of morphologically simplex forms in (38b).

(38) a. obstruent-final verbal stems

/mak ^o v ^o s ^o i/	[mak ^o is ^o i]	'to block (honorific)'
/u:s ^o v ^o mjə/	[us ^o imjə]	'to laugh + and'
/c'ic ^o v ^o rə/	[c'ic ^o irə]	'to tear + in order to'
/t ^o əp ^h v ^o r v ^o /	[t ^o əp ^h il]	'to cover (future)'

b. morphologically simplex forms

/p ^o ot ^o v ^o k ^o i/	[p ^o ot ^o ik ^o i]	'dwarf tree'
/k ^o as ^o v ^o na/	[k ^o as ^o ina]	'girl'
/hət ^o v ^o re/	[hət ^o ire]	'trash'
/k'ak ^o v ^o rak ^o i/	[k'ak ^o irak ^o i]	'bits of rice'

As for the fact that the empty nucleus is always unlicensed if the preceding stem-final onset dominates an obstruent, we claim that this process can be accounted for in the same way as morphologically simplex forms. That is, the empty nucleus between the stem and suffix cannot be licensed because of the failure to form an inter-onset governing relation. Consider the structure in (39) below, where the form /mak^ov^os^oi/ [mak^ois^oi] 'to block (honorific)' is taken as an example.

(39) /mak^ov^os^oi/ [mak^ois^oi] 'to block (honorific)'

O	N	O	N	O	N
x	x	x	x	x	x
m	a	k ^o		s ^o	i

This structure contains a domain-internal empty nucleus. Since the following nucleus is unlicensed, the empty nucleus is properly governable. However, the empty nucleus resists being licensed because the neighbouring onsets fail to form a governing relation. Recall that neutral obstruents can only be governed by the negatively charmed

segment (cf. Chapter 4). Since no suffix has a negatively charmed segment in its initial onset position, we predict that the empty nucleus after an obstruent will always fail to be licensed. We thus conclude that the behaviour of the empty nucleus after the stem ending in an obstruent can be accounted for by proper government with its sub-condition, namely, inter-onset government.

Secondly, nasal-final stems also display behaviour where the empty nucleus in question obeys proper government and inter-onset government. They are the cases where the suffix either begins with a liquid, or contains a licensed empty nucleus in the governor position.

(40) a. suffix begins with /r/

/t ^o a:mv ^o rə/	[t ^o amirə]	'to fill + in order to'
/s ^o inv ^o rə/	[s ^o inirə]	'to wear + in order to'

b. suffix contains a licensed empty nucleus

/t ^o a:mv ^o rv ^o /	[t ^o amɪl]	'to fill (future)'
/s ^o inv ^o mv ^o /	[s ^o inɪm]	'to wear (gerundive)'
/anv ^o p ^o v ^o /	[anɪp ^o]	'to hug (polite)'

The fact that the empty nuclei in (40a&b) fail to be licensed can be explained in a simple way: in (40a), the two onsets surrounding the empty nucleus cannot form a governing relation; in (40b), the potential proper governor is licensed. Therefore, the empty nuclei in the above forms must be unlicensed.

Thirdly, /r/-final stems also manifest forms where the behaviour of the empty nucleus in question can be accounted for by proper government and inter-onset government. Let us first consider the case

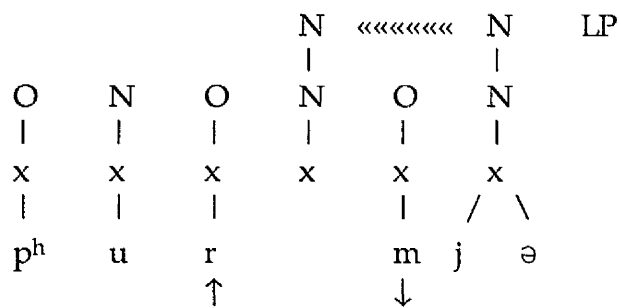
where the suffix contains an unlicensed empty nucleus in the governor position. Some examples are shown in (41) below.²³

(41) /r/-final stems

/s ^o a:rv ^o s ^o i/	[s ^o a:s ^o i]	'to live (honorific)'
/p ^h urv ^o mjə/	[p ^h ulmjə]	'to solve + and'
/k ^o ə:rv ^o rə/	[k ^o ə:llə]	'to hang + in order to'

In the above forms, the stem and suffix manifest non-analytic morphology. Thus, the empty nucleus between them is a domain-internal empty nucleus. Since it is domain-internal, it is subject to proper government. Empty nuclei in the above forms are licensed: they are followed by a nucleus that is unlicensed, and the onsets surrounding the empty nucleus form a governing relation. Since /r/ consists of a single element, it can be governed by any non-nuclear segment. This is shown in (42) below, where /p^hurv^omjə/ [p^hulmjə] 'to solve + and' is taken as an example.

(42) /p^hurv^omjə/ [p^hulmjə] 'to solve + and'



Let us now consider the case in which the stem ends in /r/, and the suffix contains a licensed empty nucleus (i.e. Cv^o). As seen above, this

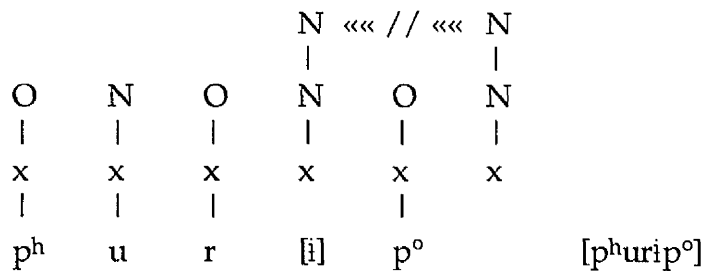
²³As mentioned above, the examples in (41) also allow forms where the empty nucleus is unlicensed. This will be discussed in the following section.

case also produces two different types of pronunciation; one type of them is given below in (43).²⁴

- (43) /amurv°rv°/ [amuril] 'to recover (future)'
 /k°ə:rv°mv°/ [k°ərim] 'to hang (gerundive)'
 /p^hurv°p°v°/ [p^hurip°] 'to solve (polite)'

Again, the fact that empty nuclei in the above forms fail to be licensed can be accounted for by proper government. Since the potential governor is licensed by virtue of being in final position, the preceding empty nucleus cannot be licensed. Thus, the empty nuclei in the above forms must be phonetically interpreted, as shown in (44) below.

- (44) /p^hurv°p°v°/ [p^hurip°] 'to solve + and'



Finally, let us consider vowel-final verbal stems. In this case, no phonetic interpretation of an empty nucleus is observed between stem and suffix. This will be explained straightforwardly if we assume that the non-analytic suffixes begin with an onset.²⁵

Since no empty nucleus is visible after the stem, no vowel is audible between the stem and suffix. This is illustrated with the form /k°a + nv°/ [k°an] 'to go (past tense)'.

²⁴In the other type of pronunciation, the empty nucleus is licensed, and the stem-final /r/ is not interpreted; e.g. [amull], [k°ə:m] and [p^hup°] respectively (cf. 6.3.2.3.3).

²⁵It follows from this that the suffixes in (30&31) begin with an onset, rather than with an empty nucleus.

(45) /k°anv°/ [k°an] 'to go (past tense)'

O	N	O	N
x	x	x	x
k°	a	n	

So far, we have discussed the cases where the empty nucleus between the stem and suffix behaves exactly the same as that of morphologically simplex forms. What is revealed is that the empty nucleus in these cases can be accounted by proper government and inter-onset government. In the following section, let us discuss the cases in which the empty nucleus behaves differently from that of morphologically simplex forms.

6.3.2.3 Problematic cases

6.3.2.3.1 The empty nucleus between a nasal and a neutral obstruent

We have seen that an empty nucleus between a nasal and a neutral obstruent²⁶ in verbal inflectional morphology fails to be licensed (cf. 46b). This is the case which shows a different pattern from the morphologically simplex forms in which the empty nucleus is licensed, and the following neutral obstruent alternates with the corresponding negatively charged segment (cf. 46a).

²⁶As mentioned above, Korean manifests only one suffix which begins with a neutral obstruent followed by an unlicensed nucleus: /s°i/ (honorific).

(46) a. morphologically simplex forms

/s°o:ŋv°k°os°v°/	[s°o:ŋgot°]	'gimlet'
/c°aŋv°t°ori/	[c°aŋdori]	'hammer'
/s°i:mv°p°urv°mv°/	[s°i:mburim]	'errand'
/namv°c°is°v°/	[namɕit°]	'over'
/k°anv°s°u/	[k°anzu]	'keeping'

b. verbal inflectional morphology

/nə:mv°s°i/	[nəmis°i] (*[nə:mzi])	'to go over'
/s°inv°s°i/	[s°inis°i] (*[s°inzi])	'to wear'

As for the process in (46a), we claimed in Chapter 4 that in order to form a governing relation, the neutral obstruent is strengthened to become a negatively charmed segment by the acquisition of L⁻ from the nasal in the governee position (cf. 47).

(47) /c°aŋv°t°ori/ [c°aŋdori] 'hammer'

O	N	O	N	O	N	O	N
x	x	x	x	x	x	x	x
c°	a	v°		R°	o	r	i
		ʔ°		ʔ°			
		N ⁺		h°			
		L ⁻	⇒				
							[c°aŋdori]

However, this strategy cannot apply to the examples in (46b) in which the empty nucleus in question fails to be licensed, and the following /s°/ does not alternate with [z]. What makes the empty nucleus unlicensed? In fact, in the situation where there is only one suffix (i.e. /s°i/) which is eligible for discussion, it is difficult to arrive at the

correct explanation for the interpretation of the empty nucleus between the nasal and neutral obstruent in verbal suffixation. Thus, the following discussion is speculative.

What we observe from the examples in (46b) is that the element L- in the stem-final onset does not spread to the following onset containing /s^o/. For this reason, there is no governing relation between the two onsets. Let us assume that there is no *spreading* of the element L- in the sequence involving a nasal followed by a neutral obstruent. If this is the case, it is obvious that the empty nucleus intervening between the nasal and the following neutral obstruent fails to be licensed, because the nasal, which is the potential governee, is more complex than /s^o/ which is potential governor.

(48) /s^oinv^os^oi/ [s^oinis^oi] 'to wear (honorific)'

O	N	O	N	O	N
x	x	x	x	x	x
s ^o	i	n		s ^o	i
		↑	—	//	—
				↓	
					[s ^o inis ^o i]

This type of explanation makes the case of morphologically simplex forms problematic. I would like to claim that the two onsets surrounding the empty nucleus share L- in the lexical representation, rather than the case where L- in the first onset position spreads to the following onset position.

(49) /c°aŋv°t°ori/ [c°aŋdori] 'hammer'

O	N	O	N	O	N	O	N
x	x	x	x	x	x	x	x
c°	a	v°	R°	o	r	i	
		ʔ°	ʔ°				
		N ⁺	h°				
			/				
		L ⁻					

[c°aŋdori]

Since the onset following the empty nucleus contains L⁻, it is negatively charmed. Therefore, this onset can form a governing relation with the preceding onset dominating a velar nasal.²⁷ Since the potential proper governor is unlicensed, the empty nucleus within the inter-onset governing relation will be licensed.

The above discussion predicts that Korean never allows pseudo-sequences such as [ms°], where a nasal is followed by a neutral obstruent, but allows either sequences such as [mz] where the second member of the sequence is realised with L⁻, or [mis°] where the two consonants are separated by an unlicensed empty nucleus. Indeed, it appears that this is always true in Korean: [næmzæ] (*[næms°æ]) 'smell'; [k°amis°i] (*[k°ams°i]) 'to roll (honorific)'.

We also see from the discussion above that a domain of sharing cannot be created in the lexical formation rules such as suffixation. This means that the suffix-initial /s°/ resists alternating with its counterpart which has the element L⁻.

²⁷See Chapter 4 for the licensing of domain-internal empty nuclei in Korean.

6.3.2.3.2 Unsolved problems

6.3.2.3.2.1 Between two nasals

Firstly, let us consider the empty nucleus cases where the stem ends in a nasal and the suffix begins with a nasal. In these cases, the empty nucleus invariably fails to be licensed, as is shown in (50) below.

(50) the empty nucleus between nasals in verbal morphology

/k ^o a:mv ^o mjə/	[k ^o amimjə]	'to roll + and'
/s ^o inv ^o mjə/	[s ^o inimjə]	'to wear + and'
/k ^o a:mv ^o ni/	[k ^o amini]	'to roll + because'
/s ^o inv ^o ni/	[s ^o inini]	'to wear + because'

These verbal forms show a different pattern from the morphologically simplex forms in which the empty nucleus never fails to be licensed, as shown in (51) below.

(51) the empty nucleus between nasals in morphologically simplex forms

/k ^o ə:nv ^o nə/	[k ^o ə:nnə]	'to cross'
/k ^o ənv ^o manv ^o /	[k ^o ənman]	'but'
/a:mv ^o manv ^o /	[a:mman]	'amount'
/k ^o umv ^o nirv ^o /	[k ^o umnɪl]	'do a stretch-up'
/k'amv ^o njaŋv ^o /	[k'amnjaŋ]	'ability'
/p ^o aŋv ^o maŋi/	[p ^o aŋmaŋi]	'a club'
/maŋv ^o nani/	[maŋnani]	'wretch'

In Chapter 4, we tried to account for the case of morphologically simplex forms with the Complexity Condition (Harris 1990: 274) which allows a governing relation between two onsets when the governor has an equal or greater number of elements than the governee. If this

condition is correct, we cannot account for the case of verbal inflectional morphology, because there is no phonological reason why the intervening empty nucleus resists being licensed.

One could claim that in Korean, nasals cannot govern each other. A simplex segment (i.e. a segment that consists of a single element) can be governed by a neutral segment, but complex segments cannot have neutral governors. This follows from the fact that /r/, which consists of R° only, can be governed by other neutrally charmed segments (cf. 52a), whereas neutral obstruents do not allow neutral governors (cf. 52b). Nasals, apart from the case of nasal sequences in morphologically simplex forms, do not allow neutral governors either (cf. 52c).

(52) a. when the potential governee is /r/

/p°ərv°re/	[p°əlle]	'insect'
/t°arv°ræ/	[t°allæ]	'to soothe'
/k°o:rv°mok°v°/	[k°o:lmok°]	'alleyway'
/p°harv°mæ/	[p°halmæ]	'throwing'
/t°a:rv°k°i/	[t°a:lk°i]	'strawberry'
/k°arv°p°i/	[k°alp°i]	'rib'

b. when the potential governee is a neutral obstruent

/s°inap°v°ro/	[s°inap°iro]	'gradually'
/t°ut°v°rək°i/	[t°ut°irək°i]	'rash'
/nak°v°ne/	[nak°ine]	'stranger'
/t°ot°v°mi/	[t°ot°imi]	'sieve'
/c°ik°v°s°i/	[c°ik°is°i]	'patiently'
/p°ot°v°k°i/	[p°ot°ik°i]	'dwarf tree'

c. when the potential governee is a nasal

/mjənv°ri/	[mjəniri]	'son's wife'
/omv°ri/	[omiri]	'to shut'

/k°v°rəmv°ro/	[k°irəmiro]	'therefore'
/s°o:ŋv°k°os°v°/	[s°o:ŋgot°]	'gimlet'
/c°amv°k°i/	[c°amgi]	'to sink'
/p°anv°t°v°s°i/	[p°andis°i]	'certainly'

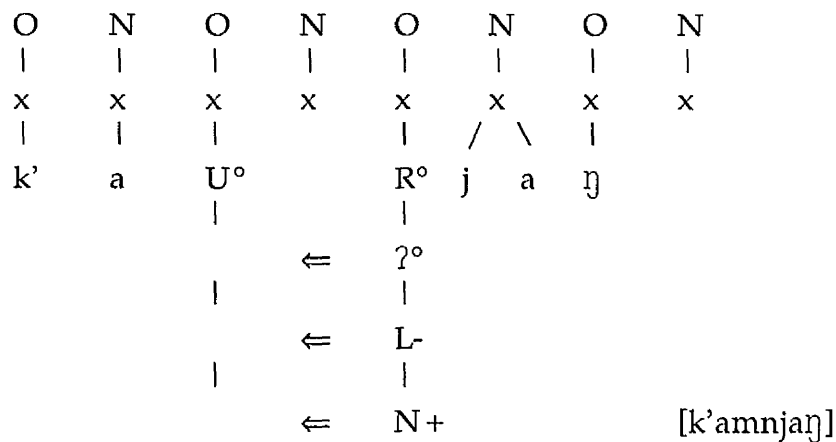
If the claim that complex segments cannot have neutral governors is correct, then we can explain the fact that the empty nucleus between nasals in verbal inflectional morphology fails to be licensed: since the potential governee (i.e. the nasal) is complex, it cannot form an inter-onset governing relation with another nasal which is neutrally charmed. Thus, the intervening empty nucleus must be phonetically interpreted, as shown in (53) below.

(53) /k°amv°ni/ [k°amini] 'to roll + because'

O	N	O	N	O	N
x	x	x	x	x	x
k°	a	U		R	i
		ʔ°		ʔ°	
		L-		L-	
		N+		N+	
		↑	//	↓	
					[k°amini]

This analysis seems quite reasonable but creates a problem concerning morphologically simplex forms: recall that an empty nucleus is licensed between nasals in the morphologically simplex cases. One could claim that the apparent nasal in the governee position contains only a single element so that it can be governed by the nasal in the governor position; and the governee is realised as a nasal by acquiring all other elements from the governor, as below in (54).

(54) /k'amv°njaŋv°/ [k'amnjaŋ] 'ability'



At first glance, the above structure seems to be reasonable. However, it cannot be correct for the following reasons: firstly, Korean does not allow onsets which contain only U° in the lexical representation (i.e. there is no /w/ segment in Korean); secondly, if the above analysis were correct, Korean should not allow a liquid before a nasal (i.e. [lm]), because the element R° must be realised as [n] by acquiring other elements from the nasal in the governor position. However, Korean abounds with such sequences (e.g. /p°ir°vmi/ [p°ilmi] 'excuse'). Thus, the analysis in (54) cannot be accepted.

From the above discussion, we see that the hypothesis cannot be the correct one for solving the problem. I thus leave this issue as an open question.

6.3.2.3.2.2 The empty nucleus after /r/

In (30&31), we saw that the empty nucleus after /r/-final stems may or may not be licensed. Thus, the inflectional forms of /p^hur(v°)/ 'to

solve' are realised with the licensed or unlicensed empty nucleus, as shown in (55) below.

(55) $p^{hur} + mj\emptyset$ $[p^{hul}mj\emptyset]$ $[p^{hurim}j\emptyset]$ 'to solve + and'

$p^{hur} + m$ $[p^{hurim}]$ $[p^{hum}]$ 'to solve (gerundive)'

We have discussed the forms in the second column in 6.3.2.2. They respect my analysis. However, the forms in the third column are problematic. Firstly, we cannot find any phonological reason for the fact that the empty nucleus in $[p^{hurim}j\emptyset]$ is phonetically interpreted. Notice that the empty nucleus is followed by a nucleus which is unlicensed, and the two onsets surrounding it can form a governing relation. The form $[p^{hum}]$ (<-- $/p^{hurv^{\circ}mv^{\circ}}/$) is another case that we cannot solve. In this form, the potential proper governor is licensed, therefore, the empty nucleus is not properly governable, but is licensed, and the preceding $/r/$ is not interpreted.²⁸ I have to leave these as open questions.

Nevertheless, a word must be said on this issue. That is, $/r/$ -final verbs are not the only cases that allow two pronunciations. $/h/$ -final verbs also manifest a similar pattern, as shown in (56) below.

²⁸The form $[p^{hum}]$ can be derived if the suffix is analytic: $/[[p^{hurv^{\circ}}]mv^{\circ}]/$ (see Chapter 5 for the derivation of this type of structure). If this is the case, we must say that $/r/$ -final stems allow two different morphological structures, such as the English word 'dream' which allows two forms, $[dr\epsilon mt]$ and $[dri:md]$, for the past tense. However, it is not very reasonable to say that all $/r/$ -final stems allow two forms. Notice that not all $/m/$ -final stems allow two forms in English.

(56)	/nohv°/ 'to put'	/nahv°/ 'to give birth'
/s°i/	[nohis°i] ²⁹ ~ [nos°i]	[nahis°i] ~ [nas°i]
/mjə/	[nohimjə] ~ [nomjə]	[nahimjə] ~ [namjə]
/ni/	[nohini] ~ [noni]	[nahini] ~ [nani]
/rə/	[nohirə] ~ [norə]	[nahirə] ~ [narə]
/mv°/	[nohim] ~ [nom]	[nahim] ~ [nam]

As can be seen in the above examples, the empty nucleus after /h/ may or may not be licensed. That is, although these differ from /r/-ending stems in that the stem-final /h/ is optionally deleted before a suffix containing an unlicensed nucleus (e.g. [nomjə]), the behaviour of the empty nucleus after stem-final /h/ is such that it may or may not be licensed: in one case, the empty nucleus after /h/ is licensed³⁰, and in the other case, it is unlicensed. This means that the two types of stem (i.e. /r/- and /h/-final stems) share the fact that they allow two forms in all cases.

What we should retain from the cases of /r/- and /h/-final stems is that they both contain a single element. The former contains the element R° and the latter contains h°. Thus, the only statement we can make is that an empty nucleus between the stem and suffix may or may not be licensed if the stem-final onset contains a single element.

We have so far discussed the behaviour of the empty nucleus between the verbal stem and suffix. Throughout the discussion, we have found

²⁹Recall that /h/ is optionally uninterpreted between the two unlicensed nuclei.

³⁰What is interesting is that, in Korean, /h/ can never be interpreted if it is followed by a licensed empty nucleus. It may be the case that the combination of the two elements h° and ?° is not possible in Korean. Note that no other grammatical categories such as nouns, which can appear without suffixes in an utterance, allow h° in the apparent final position. Also note that we may trace /h/ only in the analytic verbal morphology where the suffix begins with a neutral obstruent other than /s°/. In this case, the stem-final /h/ combines with the following neutral obstruent, yielding an aspirated counterpart (e.g. /[[nohv°]k°o]/ [nok^ho] 'to put + and'). As for the process of aspiration, see Rhee (in preparation) for a detailed discussion.

that verbal inflectional morphology manifests non-analytic structure. Thus, in most cases, the behaviour of the empty nucleus between the stem and suffix can be accounted for by proper government and inter-onset government. We also found that nasals cannot be governed by a neutral segment, thus, the empty nucleus between nasals, or between a nasal and a neutral obstruent fails to be licensed. On the other hand, we cannot account for the case of /r/- and /h/-final stems which I leave as open questions for further research.

CONCLUSION

In this thesis I discussed the behaviour of empty nuclei in Korean. I claimed that the vowel [i] is the phonetic manifestation of an unlicensed empty nucleus, and that an apparent consonant cluster is in fact separated by an empty nucleus that is licensed. In fact, I have shown that Korean allows only open syllables.

We saw that the domain-final empty nucleus in Korean is licensed, thus the vowel [i] is not audible in this position. However, unlike other languages such as French, this position has restricted licensing properties. It follows from this that domain-final onset undergoes neutralisation.

I have also shown that in double consonants simplification can be accounted for by the notion of 'government-licensing'. We assumed that double consonants are in fact morphologically complex, and that the stem and suffixes manifest analytic morphology. Since the governing relation between the two onsets across a licensed empty nucleus is not licensed by the domain-final empty nucleus, one of the two consonants must be uninterpreted.

As for the licensing of domain-internal empty nuclei, we have seen that it is controlled by proper government and inter-onset government. Concretely, a domain-internal empty nucleus is licensed if it is both followed by an unlicensed empty nucleus at the level of licenser projection, and is within a governing relation that is formed between the two surrounding onsets.

I also discussed the empty nucleus in nominal and verbal suffixation. We saw that the suffixes that trigger [i]-zero alternation between the stem and

suffix are non-analytic. In the case of nominal suffixation, [i]-zero alternation is accounted for by proper government and inter-onset government. On the other hand, [i]-zero alternation in verbal suffixation faces certain problem which requires further research.

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